Amœbae in Pyorrheal Pockets.

By C. Edmund Kells, D.D.S., New Orleans.

The fact that Drs. Barrett and Smith of the University of Pennsylvania, that Drs. Bass and Johns of Tulane University of Louisiana, and Dr. Angelo Chivaro of Rome, Italy, independently discovered the presence of amœbae in the pockets accompanying pyorrhea, and at the same time announced that ipecac is a specific for amœbae, is sufficient in itself to make ordinary dentists "sit up and take notice."

Drs. Barrett and Smith inject emetin into the pyorrhea pockets and their walls, while Dr. Bass injects it hypodermatically into the arm.

The latter method appears to me the better of the two, and so I have adopted it. The one almost painless hypodermatic puts the full dose into the blood stream, while with Dr. Barrett's method of injecting the pockets, one would usually have many injections to make.

It being the writer's good fortune to be personally acquainted with Drs. Bass and Johns, it was but natural for him to obtain from them careful instructions in this pratique.

Believing that at this time all dentists who have the welfare of their patients at heart, should investigate this subject freely, the writer is giving a detailed account of the method of treatment now pursued in his office, as suggested by Drs. Bass and Johns.

1. If, upon examination of the mouth, pyorrhea is either suspected or recognized, a microscopic examination is determined upon.

2. From around which teeth the scrapings are taken is noted, and a glass slide is prepared accordingly, as shown in Fig. 1.

Here the No. 1 represents the patient's number. The symbols record from which teeth the scrapings were taken, the etchings are done with a

Fig. 1.

RECORD

1914 Dec.	Name	Amœbae	Hypo	Tablets	Condition
31	Mr. Brown	Plenty	Yes	No	Bad
"	Mr. Smith	Few	No	Yes	Favorable

Fig. 2.

small carborundum stone in the engine, so that they are indelible—being a much better method than writing upon the slide with a glass pencil, which marks are easily effaced.

3. Scrapings are then taken from the pockets, recorded, and smeared very thinly opposite their respective symbols. These scrapings should be taken from the *bottoms* of the pockets, and should be as free from blood as possible, "which is easier said than done." Sometimes a tooth-pick properly trimmed, at other times Younger scalers are used for this purpose.

4. The patient's name and the number of the slide are then recorded on a sheet prepared for the purpose, and kept in our loose leaf day book.

5. An immediate examination of the slide may be made for the *live amœbae,* but time may usually be much better employed than in such a search while the patient is in the chair, so it is immediately properly heated to fix the specimens.

6. At our convenience the slide is stained and a microscopic examination is made, the result being recorded in the book.

7. If the examination proves negative, assuming that it might be through error in technique, at the next sitting a duplicate is made. Every effort must be made to positively recognize the amœbae.

8. If the case is a bad one, one-half grain emetin hydrochloride in 1 c.c. of distilled water is injected in the left arm near the shoulder, for each of three successive days—*they must be successive.*

Unless the solution is freshly made and therefore warm, the syringe should be heated by being well rinsed out with boiling distilled water, which will in turn warm the emetin to the proper temperature for injecting.

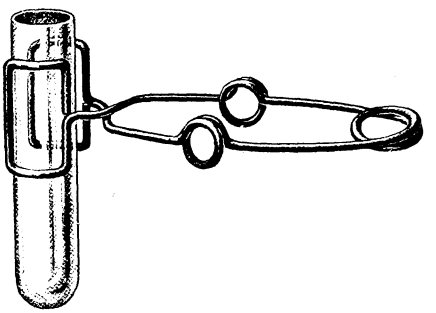


Fig. 3.

9. Only fresh solutions should be used, which are readily made by dissolving one tablet in 1 c.c. of distilled water at the time of use, or if well taken care of, sufficient for three doses can be prepared at once. In some cases some soreness of the arm follows the injection.

10. If the disease is limited apparently to one or two teeth only, instead of giving the hypodermic of emetin, one bottle of forty tablets of ipecac that does not dissolve in the stomach is prescribed, three to be taken twice daily after meals.

11. The patient is instructed to put two drops of fluid extract of ipecac in a small quantity of water and to rinse the mouth most thoroughly the last thing at night, after the teeth have been properly brushed and cared for.

12. At the end of about a month, a second microscopic examination is made. If amœbae are found, then a second series of emetin is injected for those treated under caption 8, and for those under 10, emetin must be used hypodermatically.

At this stage I must "leave off" for I have gotten no further, not having used the treatment for two full months at this writing.

Whether or not emetin is a specific for Rigg's disease cannot be determined by the writer in such short time, but it is a well-confirmed fact that under this treatment the conditions in the mouth are vastly improved—whether permanently so, time only can determine.

One cannot learn to discover amœbae by the absent method, but personal lessons must be taken from a bacteriologist. Where this is impossible, due to the location of the dentist, he should arrange to take the specimens and forward them to some laboratory for diagnosis.

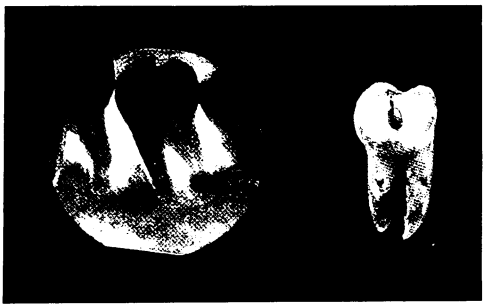


Fig. 3.

Amœbae are old friends of bacteriologists. Emetin as a specific for them is not a new remedy, consequently up to this stage there is no experimentation, when this remedy is given. The only newly recognized feature is that if there are amœbae *within the tissues* of the mouth, they will be destroyed.

In Fig. 2 is shown the manner in which these cases are recorded and kept track of at present. Possibly a better method may be learned later.

An all glass syringe is necessary for this use, and every precaution must be used to insure thorough antisepsis. An iridio-platinum needle is advisable but not necessary. A small tube is first filled with distilled water which is boiled for a few minutes and then thrown out. A little more (to allow for evaporation) then three c c. of fresh distilled water are then placed in the test tube and boiled—then three half-grain tablets of emetin hydrochloride are dissolved therein.

The syringe and needle if not previously boiled in distilled water and kept in a sterile condition, are now boiled, and 1 c.c. of the prepared solution drawn in. The arm is bared and the spot selected for the injection is touched with lysol—that is all that is necessary to render the spot aseptic—and the injection made in the usual manner. The syringe

and needle are now thoroughly rinsed with distilled water, well boiled in distilled water and placed in a sterilizer for safe keeping.

Teeth that are in the condition as was this molar (Fig. 4) are hopeless, of course, and should be extracted.

The skiagraph shows the alveolus to have been practically all destroyed. The tooth could have been removed with the fingers.

This treatment will not bring the dead to life. The hope is that used in time it will *prevent the ravages of the disease.*

P. S.—Since receiving the above, a communication from Dr. Kells arrived too late for alteration of the illustration of his microscopic slide (Fig. 1). He states that at present he marks the slide with plus or minus signs (+ or —), to indicate at a glance the presence or absence of amœbae in the specimens, thus saving much time if future examinations of the slide must be made.—EDITOR.

The Causes of Abnormalities—Heredity or Environment.

By Charles E. Woodruff, M.D., Lt.-Col., U. S. Army (Retired), Co-Editor American Medicine, New York.

Read before the American Society of Orthodontists, Toronto, 1914.

The investigations of recent years have brought to light many facts which may solve the old puzzle as to the relative influence of heredity and environment in the production of abnormalities. All medical men, especially orthodontists, are vitally interested in such academic studies, and it is to them we must look for facts which will lead the way to prevention. In searching for causes we will be led astray unless we keep clearly in mind some of the basic principles of heredity and development. In the first place, let it be fully realized that the great law of origin of species by the selection of favorable variations—what is commonly known as Darwinism— has been so thoroughly proved to be true that it is now the basis of all the biologic sciences. We are not yet sure about the causes of variations and it has been proved that some of Darwin's guesses are not correct, but the great law itself remains exactly as he stated it. Recently it has become almost a fad with a few writers —particularly clergymen—to state that Darwinism has been abandoned by biologists, but the truth is the opposite.

Known Facts In Regard to Specific Characters.

Briefly, the known facts are as follows. No two offspring of a pair of beings are exactly alike. Far more are born than can possibly survive, and there are many lethal agents which kill off the surplus, the survivors of this slaughter being those whose variations enabled them to escape. These survivors transmit their new traits to their offspring, which as a whole are therefore slightly

different from their grandparents. By the accumulation of these minor differences generation to generation, new species arise.

Variations in Species.

The puzzle has always been to account for the variations and to explain why they are transmissible. Lamarck conceived the idea that the use or disuse of organs or parts causes hypertrophy or atrophy and these modifications are transmitted. This theory was long rejected because there was no evidence that any modification of the body or somatic cells ever influenced the germ cells in the ovary or testicle so that they reproduced a mutilation or any other modification. We have certain proof that men have lost teeth for many tens of thousands of years, probably hundreds of thousands, and yet babies are always born with the germs from which sprout all the fifty-two teeth.

Lamarckianism is beginning to be favorably considered, but it is in a sense wholly different from that theory conceived by Lamarck himself. It has been shown by many experimenters that if germ cells are acted upon sufficiently strongly mechanically or by light, heat or chemical substances, the ovum will develop into something different from the parent, and that the change in the germinal protoplasm may be permanent. That is, the ovum in its development sets aside certain cells which form the tissue of the ovary or testicle, and these cells are exact counterparts of the ovum. The germ cell has no power to revert to the type in the grandparent or in the parent before the poisoning. It has been permanently changed, but in the absence of such a poisoning, the germ cell is the same, generation after generation. This is what Weismann calls the "continuity of the germ plasm." The body is considered a mere temporary home for the germ plasm and dies as useless as soon as a piece of the protoplasm is cut off and builds up a new home for itself.

Weismannism.

Weismannism does not deny that the germ cells are ever modified in the ovary or testicle so that they develop differently from the parents. Indeed it assumes that this always happens as it is practically impossible that the blood serum which bathes these cells should be constant in composition or in its dissolved chemicals. This constant variation in the cell's environment must so prevent uniformity that no two germ cells are exactly alike. The new viewpoint is this: the modified germ cells develop into something more or less different from the two parental types—not necessarily resembling either or the mean between them. Weismannism assumes that variations of nutrition or poisoning by abnormal substances in the blood serum of the parent permanently modify the germ plasm, so that it develops a body different from the parent, and that the parts

of the germ plasm which form the germ cells in the ovary of this offspring will necessarily repeat the process for the next generation. The more perfect the manner of living, the less will be these changes in the germ plasm and the more closely will the offspring resemble each other and the parental type. That is, no variation of the body is of itself transmissible. What is handed down, is the changed condition of the germ plasm, and this new protoplasm will continue to develop these new body forms as long as it is not modified by later factors.

Mutilations of the body can have no possible effect on the germ cells and are therefore never transmitted. Nor are any other modifications or acquirements of the body ever transmitted. A man may become very distorted from occupational stresses but his children are born as he was born. A man may become very learned in a certain line but the knowledge is never transmitted. Similarly, training of the body or brain, may develop that body or brain to better efficiency, but it has no effect whatever on the next generation, except that such a parent may be able to teach his children better than an ignoramus could.

By looking to the environment for the cause of every departure from the type which heredity would produce, we find that modifications and variations are identical in being due to environmental causes. The former are changes in the body due to mutilation, disease, malnutrition, etc., and, having no effect on the germ cells are not transmissible. Variations on the other hand are developmental changes due to permanent changes in the germ cells from environmental causes, and appear in later generations. Mendel's discovery shows that the union of the male and female cells does not create anything new, since the characters are transmitted as indivisible units. If a harmful modification is not fatal it does not effect the species for it is an individual matter which disappears in the next generation, but a harmful variation may eliminate that type from the accumulation of injuries, generation to generation.

There was recently a discussion as to whether these permanent changes in the germ plasm are always minute and found in every generation, or whether they occur occasionally and in marked degree. DeVries championed the latter idea and said that evolution occurs by sudden jumps due to the appearance of these big variations which he called "mutations." It is now known that one of the plants he studied (a primrose) was a hybrid and that the changes he called variations are merely reversions. The drift is now back to the original idea of Darwin that variations are minute and evolution gradual. All the controversialists agree that the changes are due to causes acting on the germ plasm, and that they are purposeless, some being actually harmful, others of benefit, and the latter have the advantages in the competition for survival.

We need not discuss Mendel's laws, as they deal merely with the manner in which the various qualities of the two parents are segregated in the germ plasm and may appear as "dominant" in the offspring or be hidden as "recessive," and in later generations may not enter the germ plasm at all. The point we are to remember is that the germ plasm is composed of a piece of the germ plasm of each parent in different proportions.

There is then no mystery about heredity. The word merely means that germ plasm does the same things generation after generation as long as it is not chemically changed by something in the environment. The mystery is the manner in which a germ cell develops the body by multiplication and specialization of the cells and their arrangement into tissues and organs. Little is known of this process, though some progress has been made in explaining it. As it has no possible connection with the process we call heredity it does not concern us here.

Weismannism does not say what the modified germ cell will produce in its development by multiplication. That can never be foretold because of the almost infinite number of changes possible in such highly complex substance, formed of many groups of molecules each containing hundreds of thousands of atoms. The forms of body produced are legion, and some of them are fitter to survive than the others, which range around the fittest in accordance with the mathematical laws of probabilities. The great advantage of Weismannism is the way it settled the baseless idea that a modification of the body so influenced the germ cells in the ovaries or testicles that they would develop into a body possessing the same anomaly.

Modifications of Bacterial Forms.

It was also an advantage to learn that heredity in multicellular organisms was identically the same as in the unicellular such as bacteria which are so easily modified by the environment. In the latter we can readily see that all modifications or acquirements are transmitted because the body is the germ cell, and after division the cells or new organisms are merely the two halves of the parent. Bacteria are very easily modified by a new environment—indeed such change is the rule, and this susceptibility makes it possible for the bacteria to revert to the original form as soon as the original environment is restored. Regeneration is the rule, and this is a very vital matter in studying the degeneration which in the human species is accompanied by so much dental abnormality.

However, there are a few instances on record where such marked change has taken place in the protoplasm of bacteria and higher plants by a new environment that they have not been able to revert upon restor-

ation of the original environment, but remain what is practically a new species artificially produced. The smallpox germ which is probably a protozoon is also permanently changed by residence in the cow, and does not revert when it re-enters man. In this direction, research is now being directed with a view of producing vaccines for cure or prevention without the slightest risk of producing the original disease or any of its dangers or complications.

Regeneration Principle in Man.

In man regeneration is the rule even after considerable degeneration has been caused by adverse factors. That is, a man may have been so stunted or deformed in the developmental stage that we would presume the germ cells could not be normal, and yet if his infant is properly fed and managed it may develop into a normal adult. Unfortunately the uterus of a degenerate woman is a bad home for an ovum which is liable to malnutrition or poisoning from the abnormal blood serum of the mother which nourishes it through the placental membranes. Hence the offspring may start extra-uterine life already damaged so greatly that it cannot develop properly. Degenerates thus may give birth to degenerates, but it is not fair to call this heredity. The germ cell may have entered the uterus in a perfectly normal condition, and may have been damaged by this adverse environment. It subsequently develops badly, but may not reproduce a single abnormality possessed by the mother or father.

Influences of Alcoholism.

It is evident that maternal abnormality is far more effective in damaging an ovum than the paternal. This is specially evident when the mother is an alcoholic, for she poisons the germ cells before conjugation with the male cells, and for nine months afterwards. Her children become progressively more and more degenerate, until the later ones are not viable. In the last stages she aborts earlier and earlier until sterility follows.

Influences of Syphilis.

In syphilis the course of events is the exact opposite. Abortion is the rule in the early stages, but as the disease is cured the later pregnancies are longer and longer until the full term is reached but the child is not viable. In time perfectly normal children appear. This is merely an infection and has no relation to heredity—though we call it hereditary syphilis to show that the trepomenas were obtained from a parent. It would be better to call it congenital or prenatal infection.

Degeneration.

By common consent the word degeneration is applied to those in whom the nervous system is at fault, and in our ignorance of the exact chemical

change which has taken place in the nerve protoplasm, we merely called it "instability," for this term expressed the most prominent characteristic. This change has first taken place in the germ cell probably from some kind of poisoning. Necessarily then it must be hereditary for at least one generation, for this damaged germ cell reproduces unstable germ cells like itself. The nervous system produced by such a damaged germ cell is so unstable that it may go wrong in any one of dozens of different ways, producing the great class of neurotics—people of every grade of intelligence from idiocy to genius, with every form of bodily defect or abnormality called the stigmata of degeneration, with every kind of nervous abnormality from hysteria to epilepsy, and specially prone to neuroses and insanity.

Now although the defect is in the germ cell and thus transmissible, it is not necessarily permanent. A congenital neurotic may possess sufficiently good and pure blood serum to restore his or her germ cells to a normal condition and his children may be perfectly normal especially if the conjugal partner is not neurotic. If both are neurotic the case is more or less hopeless for their direct descendants, though even in such cases regeneration of later generations may and often does occur. The tendency always is towards the normal. Only where the abnormal environment is continued and intensified do the lines tend towards extinction as Morel proved over a half century ago. The early writers on this subject were deceived into thinking that if in the worst cases with a permanently bad environment the course was progressively downward to idiocy and sterility, such was the rule when the environment was normal. They gave undue power to heredity and ignored the restoration effect of a good environment. We now know that the change in the germ plasm is not necessarily or even ever a permanency, but disappears or gets worse as the environment is good or bad. This would be a sad world if instability were permanent and even cumulative, for every family has more or less instability which would result in universal idiocy and sterility to end the race. The only thing really permanent in us is the normal. The good is hereditary and permanent, the bad temporary and non-transmissible as a rule.

Influences of Climate.

Morel himself was probably deceived by studying misplaced migrants who were in a climate to which they were physically unadjusted. Extinction is the invariable rule in such cases, and the time required depends upon the degree of unfitness. It may take only three generations as in the Anglo-Saxon in India; several generations as in the blond French in Louisiana; or several centuries as in the blond Homeric Greeks. The process is invariably accompanied by nervous instability

which is most marked in the blonds who wander from their normal cold, dark, northern climate to one which is hot and light, but the cause is the constant bombardment of adverse factors for which they have no physical protection such as pigment in the skin.

Arrest of Development.

Very frequently the results of arrest of development are erroneously considered to be evidence of direct heredity when they appear in two or more successive generations. Any one of a thousand adversities may check the growth and development of a young ovum, foetus, infant or adolescent, and the results vary according to the stage of development when the injury was received. Arrest may occur in one or several parts so that the children though dreadfully deformed may not have the same deformities as the parents—if the parents are at fault. Unfortunately the jaws are very prone to arrest of development from any of these causes, and the process is the same in all cases where the arrest is the same in time and degree. That is, if I am not greatly mistaken, the permanent teeth come in abnormally almost according to a rule instead of absolutely at haphazard. Thus it happens that certain deformities are found in two or more generations as though they were hereditary, whereas there may have been separate causes for each generation and no hereditary influence whatever.

A few years ago, dental deformities were considered an invariable sign of an hereditary nervous instability which rendered normal development impossible. It is no doubt true that a neurotic organism is easily disturbed by an injury which is harmless to the normal. Hence among the deformed there must be more neurotic types than in the population as a whole, but we have gradually drifted away from that extreme position and in every case we are searching for the special cause which pushed the organism out of the rut it would have followed if its normal heredity had been allowed to work out its destiny. We have long ceased to consider every degenerate a result of heredity. This has been proved by a study of the one bad specimen which now and then is found in a larger family of normal children. A French investigator has asserted that in every case where an idiot is found in a large family of normal children, it was discovered that something quite serious had happened to the mother about the time of conception or during early pregnancy—an attack of typhoid fever, pneumonia or whatnot. The ovum was poisoned by the bacterial toxins and the result is practically the same as in experimental poisoning of lower animals and plants.

Influences of Tuberculosis.

It was announced some years ago, that the tuberculous gave birth to far more sexual perverts than the rest of the population. This sounds reasonable, as the toxins of the tubercle bacillus have a profound influence on the sexual system of the parent, and we could guess that they also affected that of the foetus. In such cases the mother is mostly at fault because she poisons the foetus for nine months, but an infected father must also have some effect as his spermatozooids are also poisoned.

Criminality.

All these principles are illustrated in the curious changes in our opinions relative to criminals whose anti-social actions show that they are far from normal and must have been made abnormal by the environment. The ancient idea of mere viciousness was intensified when Lombroso stated that possibly thirty per cent. of criminals are born so, and that moral reform is impossible without reforming the brain and body. Then we shifted to the opposite opinion when we learned that fully 80 or 90 per cent. of young criminals could be morally reformed by proper institutional training and then lead a normal life of good citizenship. We concluded that crime was largely a matter of teaching in a bad environment. Then we shifted again when we found that in the Iowa State Penitentiary over ninety per cent. of the criminals came from respectable families. They had a good heredity and were raised in a presumably normal environment. Criminals give birth to very few criminals as the family life is impossible in their calling. The idea of sterilizing criminals to prevent the criminality of the next generation is sheer nonsense.

The truth as to the origin of criminals has only recently been found. Binet's test shows that they are almost invariably cases of arrest of brain development. They are mental children with the moral ideas normal to children or savages of their grade of development. Prostitutes are the female counterparts of the male criminal and are all more or less feeble minded. That is, something has happened to the parents to poison or injure the ovum and prevent its developing normally. Perhaps only one of a large family becomes a criminal, the rest having had normal development.

Present inquiries are in the direction of finding out what has happened to cause this arrest of development, whether an infection, poisoning by alcohol or other drug, poor nutrition, fatigue or any one of dozens of other adversities. My own personal inquiries have shown that the cumulative effects of a bad climatic environment cause inefficiency from neurasthenia, and that the type most out of adjustment to any one locality furnishes an undue proportion of paupers, criminals and insane. That

is, criminality is not hereditary but due to the damage of a bad environment before or after birth.

It is true that a case of arrested development will be more easily damaged by the environment than a normal child. We all know of prominent men who have done well even though born in the slums. If a family is so degenerate that it drifts to the slums, the next generation is generally more degenerate from the accumulated effects of the same causes and is later damaged by the slums also. The neurasthenic or unstable nervous system is transmitted as we have already explained, but it may result in genius not criminality, and in addition it may disappear in later generations if a perfectly normal environment is supplied immediately after birth.

Criminals show the effects of bad development in their physical anomalies. I once examined two or three hundred young criminals and found barely six who could pass the physical examination of a recruit in the army and navy. In only two were there no discoverable defects whatever. This seems to be the rule in all classes of abnormal men. The teeth in particular were very bad, both from neglect and defective development of the jaws. Soldiers are as nearly the average normal man as it is possible to get them, physically, morally and mentally. They contain fewer degenerates than any other class.

When the germ cell has been so seriously damaged that its development is checked soon enough to cause idiocy or imbecility, it seems impossible for a return to the normal in later generations. If feeble mindedness mates with feeble mindedness, all the children are feeble minded. In case of minor grades of the defect, mating with the normal may give some normal offspring, but the social burden of the others is so great that governments here and there are discussing the necessity of sterilizing all this class of defectives—a proposition which is sure to become law.

Heredity and Environment.

The lesson to be derived from this résumé of the present status of the effect of heredity and environment, is this: Heredity means that an unchanged piece of the germ plasm of a normal parent must develop as the parent did, and if it departs markedly from the predestined groove, something in the environment has pushed it out. Arrested or perverted development of the jaws always has an environmental cause, generally prenatal, but it may be post natal from bad nutrition or disease. Moreover a good environment (including nutrition) may restore a baby to normality which seems drifting away from it. The cause may have happened in the grand parent, so profoundly affecting the germ cells as to interfere with their development unto the third or fourth generation by

a pseudo-inheritance. Finally the tendency of all organisms is to return to the normal specific form if the environment is restored to the normal, the exceptions being those rare cases where an entirely new germ plasm has been created by the environment.

It is very evident that an intensive inquiry into the family histories of cases seem by the orthodontists, will eventually result in finding the causes of the abnormalities of the teeth and be of immense benefit in prevention, not to mention the flood of light it will shed on the relative effect of heredity and environment. You will find that quite frequently, if not always, the worst cases of deformed or arrested jaws are in the types most out of adjustment to the climate. Blonds in light countries are great sufferers from this as well as other abnormalities.

Malnutrition. The far-reaching and permanent effects of malnutrition during development must be particularly studied, for we have been in error in supposing that a temporary check to development and growth is always repaired later. During typhoid fever or any long sickness, the hair is improperly nourished, so that when the growth starts again there is a weak spot in the hair which breaks off at that point, constituting the well-known phenomenon of falling of the hair. Similarly the finger nails are starved and in this part of the nail is a transverse groove which can be recognized until it grows out to the end and is cut off. Other growing cells exhibit a similar phenomenon. Only a few years ago it was found that if a young child is seriously checked in growth by a long period of semi-starvation from disease or improper feeding, it never regains the condition its heredity would have given it. Mentally such children may be below par all their lives. These cases have rather inclined us to the view that undernutrition is the cause of the feeble mindedness which is the real basis for most prostitution and criminality. If the child is in a good environment, it may be taught to be good just as we can teach a horse or dog to behave in a certain way, but if it falls into bad associations which do not necessarily injure a moral man, it is most sure to drift into crime and prostitution.

An investigation of a few cases in which only four teeth in a child were carious and the other sixteen perfect, revealed the fact that a sickness such as a serious enteritis had long prostrated each one about the time the crowns of the four teeth were growing in the gums. I am convinced that some such explanation can be found for the frequency with which the first permanent molars are of defective material or even carious on eruption.

The period at which these crowns grow is one in which the child goes through repeated prostrations of the various infections, such as

mumps, measles and whooping cough, all of which are now known to be exceedingly serious in their effects upon the organism, interfering with its nutrition as well as poisoning it. Prenatal syphilis affects only the crowns as a rule and the first erupted. Surely the atrociously decayed teeth of the children of the slums are largely due to bad feeding, for the crowns which develop in the gums during lactation are far better than those which develop afterwards. We must remember that a large percentage of slum children are anæmic, small and chronically hungry. Dental cleanliness unquestionably prevents much of this decay, but it does not repair bad material. Savages are well fed as a rule and their teeth are usually normal and not subject to decay in spite of lack of cleanliness.

Recent work at the Wisconsin Experimental Station shows that the size of mammals at birth is a matter of heredity, and is not altered by maternal feeding, though, of course, malnutrition or infections of the mother greatly affect it. That is, the new born of a species are remarkably alike as their respective environments have been the same. Changes in tooth development come later with bad environments.

I see by the program that the internal secretions are receiving long deserved attention since they have been proved to be the cause of much other deformity, if in excess or deficiency. It is interesting to note that an English writer has collected data showing that hypo-thyroidism is an after effect of intestinal intoxication which in turn has been traced to an origin in pus foci at the orifices of the body, chiefly the teeth, and thus we have a closed chain, as in many another syndrome, having no relation to heredity. Scarlet fever has also been blamed for hypo-thyroidism resulting in cretanism and its disturbed dentition.

Another factor, whose effect is still unknown, is the intermittency of growth. This was discovered many years ago in the Russian military schools, and it was also found that during the periods of growth the child was so lazy and stupid that the usual tasks and studies had to be partly abandoned. It made better progress in the end if it ran wild a few months, for pushing at a time when rest was imperative only retarded it.* It is therefore quite likely that during those periods when the bones and connective tissues are taking all the nourishment, the teeth as well as the brain cells are suffering privation. I have been told that the rapid growth of the jaws and body after certain orthodontic work may be due to these periods and have no relation to the surgery. Unquestionably better mastication after regulation will improve general nutrition as in the case of any other dental work, but we must be on guard to avoid mistaking "post hoc" for "propter hoc." Marvellous moral improvement oc-

The Strand Magazine, November, 1900.

curs in young criminals when their nutrition is improved by any means, but it is wrong to state that bad mastication or the absorption of pus from defective teeth is the sole cause or even the principal cause of their waywardness, as recently asserted. The same plea was made by ophthalmologists a few years back, but eye defects are now known to be only contributory causes which are more or less harmless in the stable and well fed.

We can now revise our opinions of the cause of lack of harmony between the size of the teeth and size of the jaws. Jackson voices the old theory of inheritance of jaws from one parent or race and teeth from another, while Angle says that there is no substantial basis for this idea of heredity. I do not know of any statistical studies of the number of cases of disharmony which have been correlated with the existence of a small jaw in one parent and large teeth in the other. I doubt whether even under Mendel's laws of the segregation of character, such disharmony is possible. Whether a character is dominant or recessive, there is generally, if not always, harmonious development in all hybrids. In a mule, for instance, we never see the appearance of the small jaw of one parent and big teeth of the other or vice versa. The big ears of the ass are dominant, but their relation to the big head is harmonious.

In time we will always be able to find the cause of every departure from the normal—generally it is post natal, often in the parent, sometimes in the grand parent, and very rarely earlier. We will find that abnormalities themselves are not transmissible, but that the germ plasm being continuous will repeat what has been done in prior generations unless the environment changes it. We must cease to refer abnormalities to a mystical heredity and unpreventable results of the will of God, but consider them as material results of material causes which are largely avoidable. The subject is really one for preventive medicine.

Restoration of the Normal Masticatory Function of Decayed Teeth.

By A. H. KETCHAM, D.D.S., Denver ,Colorado.

Read before the Texas State Dental Association, Fort Worth, Texas, April 16, 1914.

Introduction.

In the ITEMS OF INTEREST for May, 1913, there appeared a most excellent paper, "Restoration of Occlusion by the Casting Process," by Dr. J. Lowe Young, of New York City; also a valuable discussion by Dr. R. Ottolengui and others.

Drs. Young and Ottolengui kindly loaned the speaker the fillings, models, etc., used to illustrate this paper and its discussion, and a synopsis was given in Denver, Colorado Springs, Boulder, and Fort Collins last fall. The results of these lectures are shown by some of the illustrations in this paper; also by the large collection of inlay, crown, bridge and amalgam restorations which will be shown on Friday as a clinic by Dr. Arnold, of Houston, along with some of his own restorations. Drs. Young and Ottolengui have sent lantern slides used to illustrate their lectures; those of Dr. Young's have just arrived from Detroit, where he gave a lecture on April 9th before the Michigan State Dental Society.

You may wonder why an orthodontist should presume to instruct dentists upon the shaping of the occlusal surfaces of their restorations. The answer is that the successful orthodontist must be a student of occlusion. Years ago the great Bonwill preached occlusion and demonstrated the fact of normal occlusion. Listening to one of Dr. Bonwill's lectures was a young man who had a great desire for accurate, scientific knowledge, who was willing to labor and even to sacrifice health and

financial gain for the sake of determining the truth. This young man said: "If this is normal occlusion, then I can classify malocclusion." Shortly afterwards Dr. Edward H. Angle's classification of malocclusion of the teeth, based upon occlusion, was given to the profession. To quote Dr. Young:

Fig. 1.

"Normal occlusion then became the basis of the classification and diagnosis of all cases and immediately placed orthodontia upon a scientific foundation, which fact mainly has enabled it to advance with such rapid strides during the last fifteen years.

"For the orthodontist to correct malocclusion he must of necessity have a clear and definite understanding of this ideal condition which he is attempting to restore. Thus it is that normal occlusion is the one supreme picture which the orthodontist has in mind; the beginning and the end of his anticipation of treatment, the ideal which governs the daily progress of correction of malocclusion; the standard in occlusal relations which above all it is desirable to obtain"*

Having been a student of occlusion for twelve years since first studying with Dr. Angle, I am convinced that in order to serve the public well the general practitioner of dentistry needs an understanding of occlusion even to a greater degree than does the orthodontist. And looking

*Items of Interest, May, 1913, Page 345.

back over many consultations with dentists doing general practice, I believe that they are inclined to consider a knowledge of occlusion as belonging to a special field. Thus they do not study into the minute anatomical construction as they should, seemingly feeling that a consideration of occlusion does not apply to the filling of teeth as closely as to the treatment of malocclusion.

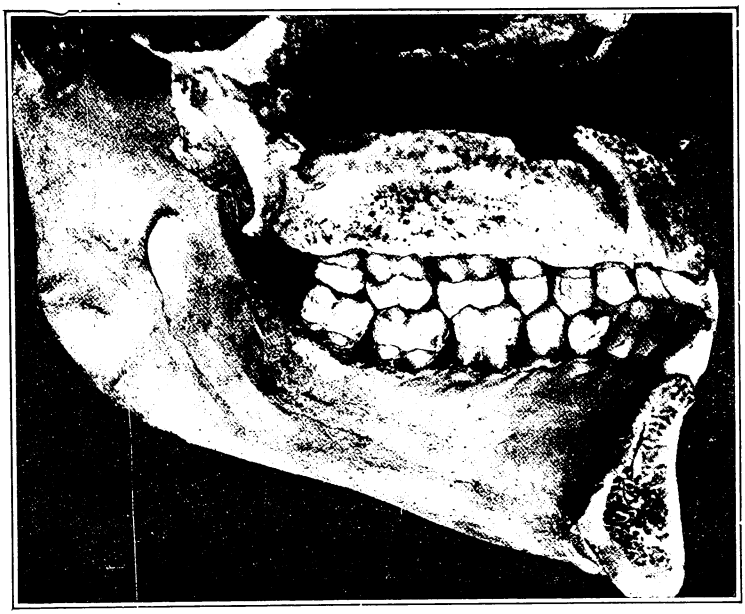


Fig. 2 (Turner)

Knowledge of Occlusion Needed by Dentists.

I am well aware that in filling teeth the dentist is often contending with problems of malocclusion, but this makes a knowledge of what constitutes normal occlusion all the more necessary. Let us for a moment study the buccal relations of the human teeth (Fig. 1). You will notice that the lower buccal teeth are one cusp in advance of the upper, and that the upper buccal teeth occlude one inclined plane outside the lower. This arrangement of the teeth has been handed down from the reptile ancestors of mammals. To quote Prof. Raymond C. Osburn, of Columbia University:

"The relation of the cusps of opposing teeth is constant and is of a very ancient order. The oldest date back to the beginning of the tri-

tuberculates, from which the primates as well as probably all other existing orders of mammals have originated; and even the youngest date back to the early primates of the lower Eocene period—a matter of some four million years, according to Walcott. In all this lapse of time, neither the general features of the occlusion nor the number, nor yet the arrangement of the cusps, has suffered any material change in the primate series leading up to man. If efficiency may be judged by stability, consider how perfect must be the dental arrangement which has persisted almost unchanged through years that can only be measured by the millions."*

Figs. 3 and 4.

If the order and arrangement of the teeth have persisted through these millions of years, is not the orthodontist or dentist who would ignore this arrangement assuming grave responsibility? Many dentists become confused when asked if the upper and lower teeth in a certain case are in their normal mesio-distal relations. Now this is very easy to determine by simply noticing the key of occlusion—the mesio-buccal cusp of the upper first molar—and noting whether it is seated in the buccal groove between the mesio-buccal and disto-buccal cusps of the lower first molar; then noticing whether the upper cuspid is received between the lower cuspid and first bicuspid. The same relations are found when these teeth are viewed from their lingual surfaces (Fig. 2).

Saving Teeth not Sufficient.

For years the idea has been prevalent among members of the dental profession that they have reached the highest pinnacle in their calling when they are able to save teeth. Since the delivery of Dr. Young's paper the profession has advanced beyond this point to that of not only saving teeth, but of restoring the entire denture to a normal working condition, where the teeth may in unison exercise their function of efficiently masticating food; thus, in our field, the entrance to the alimentary canal, we secure a nearer approach to that 100 per cent. efficiency which we should all strive to produce.

Dental Cosmos, December, 1913, page 1340.

To make anatomical restorations we must not only study the teeth as a whole, but we must be intimately familiar with the surfaces of each tooth.

The artist, with a few strokes of his brush or crayon, makes certain graceful lines and curves, which, if he is drawing a horse, will indicate speed, as in the race-horse; or, by more sturdy lines he makes a drawing indicating strength without speed, and thus we have a work-horse. This

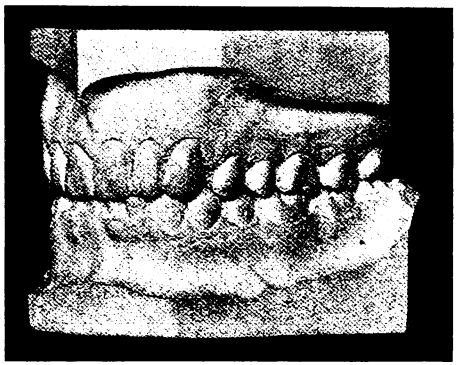


Fig. 5.

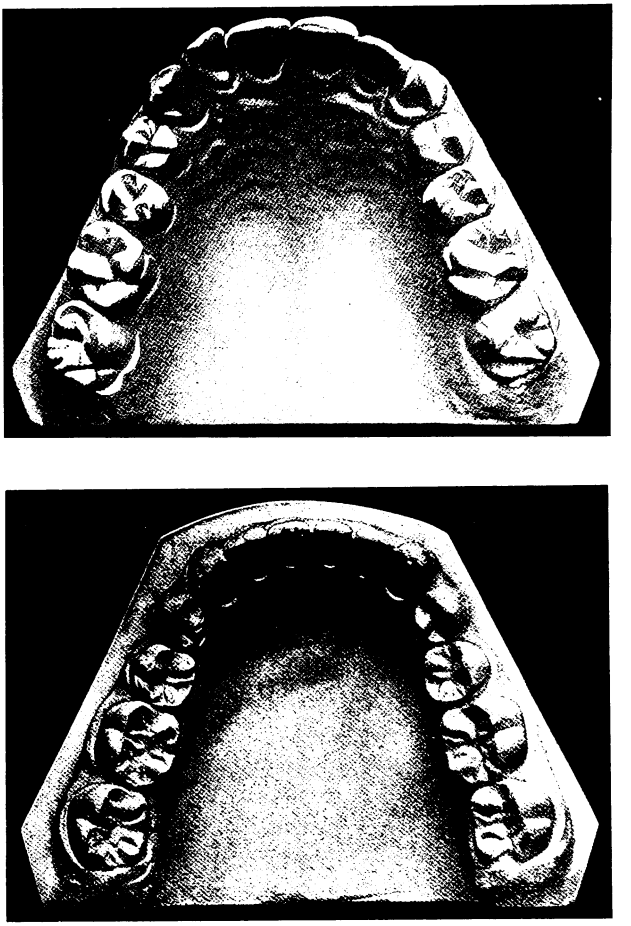
result is only possible through intimate knowledge of the anatomy of the horse. The dentist, if he would make true restorations, must be just as familiar with all the different types of teeth.

Dr. G. V. Black, in his "Dental Anatomy," has described the surfaces of the teeth with a minuteness and accuracy of detail which is marvelous (Figs. 3 and 4). We should do as he recommends while studying dental anatomy, viz., have a number of extracted teeth of the kind and denomination we are studying at hand. Not only this, but we should study all the skulls containing teeth and all the models of teeth we can obtain, and not only study the surfaces of the teeth, but their relations when in occlusion (Figs. 5 and 6).

Restoration of Masticatory Efficiency.

It seems to the essayist that too often dentists when examining mouths look at the teeth as individual units, and think only of how best to fill, treat, or crown *a* tooth; that they seldom have a mental picture of *the* teeth as a whole, comprising an efficient machine for the grinding of food. I wish to emphasize the importance of making models of each and every case which requires more than the

most simple restoration, and then the study of these models in relation to the possibility of improving the efficiency of the teeth in masticating food. The patient should be shown the models and the advantages pointed out which may be expected from anatomical restoration, remembering



(Fig. 6 (Young)

that in the normal set of teeth there are one hundred and thirty-four inclined planes in occlusion."*

Relation and Purpose of Molar Cusps.

A study of the molars in occlusion shows that the mesio-lingual cusp of the upper molar occludes in the fossa of the lower molar, where it strikes four cusps, and the disto-buccal cusp of the lower molar occludes in the central fossa of the upper molar,

*Dr. H. C. Ferris,

where it strikes three cusps (Fig. 7). These form the millstones which grind the starchy foods, while the other cusps and inclined planes of the molars and of the premolars form crushing and tearing instruments for the reduction of meats and fibrous foods. When the lower teeth are too far forward or too far backward in their relation to the upper teeth, the mesio-lingual cusp of the upper molar and disto-buccal cusp of the lower

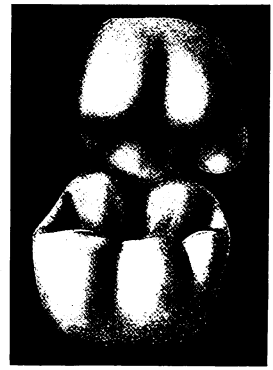


Fig. 7.

molar are brought into antagonism with approximal ridges. Thus the cusps and fossae of the molars which grind the starchy foods are brought into relation with cusps and inclined planes which do not have the mechanical form necessary for the grinding of starchy foods, and the masticating machine cannot properly prepare food for digestion.

Some human dentures have buccal teeth with long cusps and correspondingly long overbite in the incisive region; others have buccal teeth with short cusps and near end-to-end bite in the incisive region. In the first case the lateral mandibular movement is not as near a horizontal plane as in the latter case. We find these conditions down through the lower order of animals. In the carnivora with long cusped teeth, made for cutting and tearing flesh from bone (Fig. 8), there is only a vertical movement of the mandible; while at the other extreme, in the herbivora, there is a nearly flat cusp molar tooth and the widest range of horizontal movement of the mandible. In the latter the molar is spread out laterally to take advantage of the sidewise movement of the mandible so necessary to the grinding of refractory vegetable fibre. The surfaces of these teeth are divided into transverse ridges of enamel with valleys of dentin and cementum between. In the elephant, which has a backward and for-

ward movement of the mandible (Fig. 9)* as well as lateral, the plates of enamel are arranged in lozenge-shaped patterns, so that the food is ground whether the mandible is moved laterally or transversely.

According to comparative dental anatomists, food and fighting have dictated tooth forms. Therefore the teeth of the panther seal shown in Fig. 8, and those of African and Indian elephants shown in Fig. 9, have each been developed from the original cone-shapel tooth through survival of animals in each class having teeth which have been evolved into a form

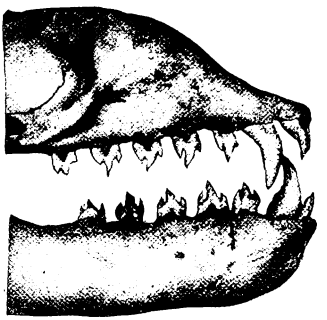


Fig. 8.

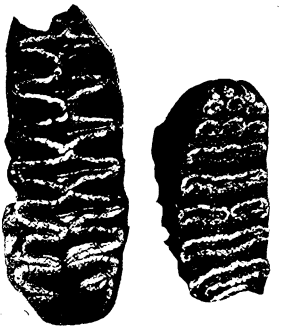


Fig. 9.

best adapted for the preparation of their food for digestion. An omnivorous diet has produced the efficient human teeth; the forms of part of our teeth being adapted to the preparation of one class of food for digestion and the forms of other teeth being especially adapted to the reduction of an entirely different class of food. How necessary then is it that the dentist should be thoroughly familiar with the most minute anatomy of all surfaces of each and every tooth, as well as with the function of each.

Importance of Copying Teeth of the Patient.

I wish to emphasize the fact that restorations for any given case should be carved so as to be of the same type as the natural teeth in that mouth; that the fossae and fissures should be no shallower nor any deeper than in the other teeth. The cusps and ridges should be no higher nor lower than the other units in that mouth, and when I say in that mouth I mean for that day; not as the cusps were before they were affected by wear, nor as they will be in years to come; but they should be made typical for that mouth at that time. Of course, this rule is

*Figs. 8 and 9 from Hopwell-Smith's "Dental Anatomy and Physiology."

sometimes modified by malocclusion, or by the teeth tipping and drifting or lengthening from the loss of tooth structure. These conditions must be taken into consideration, and a restoration, the nearest approach to typical form for that person, at that time, that it is possible to make under the circumstances, should be constructed. To illustrate this I show an amalgam restoration in an abraded tooth (Fig. 10), by Dr. R. A. Adams.

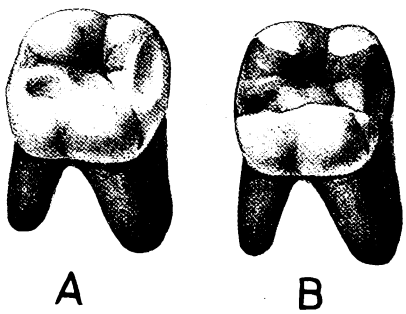


Fig. 10.
A. Shows an abraded natural tooth.
B. Shows imitation of same in amalgam.

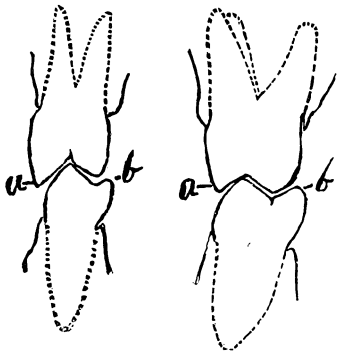


Fig. 11.
(Black)

When the teeth are in occlusion the tip of the cusp resting in the fossa should not quite reach to the bottom of the fissure. Dr. Black has described this most minutely, as you will see by Fig. 11.

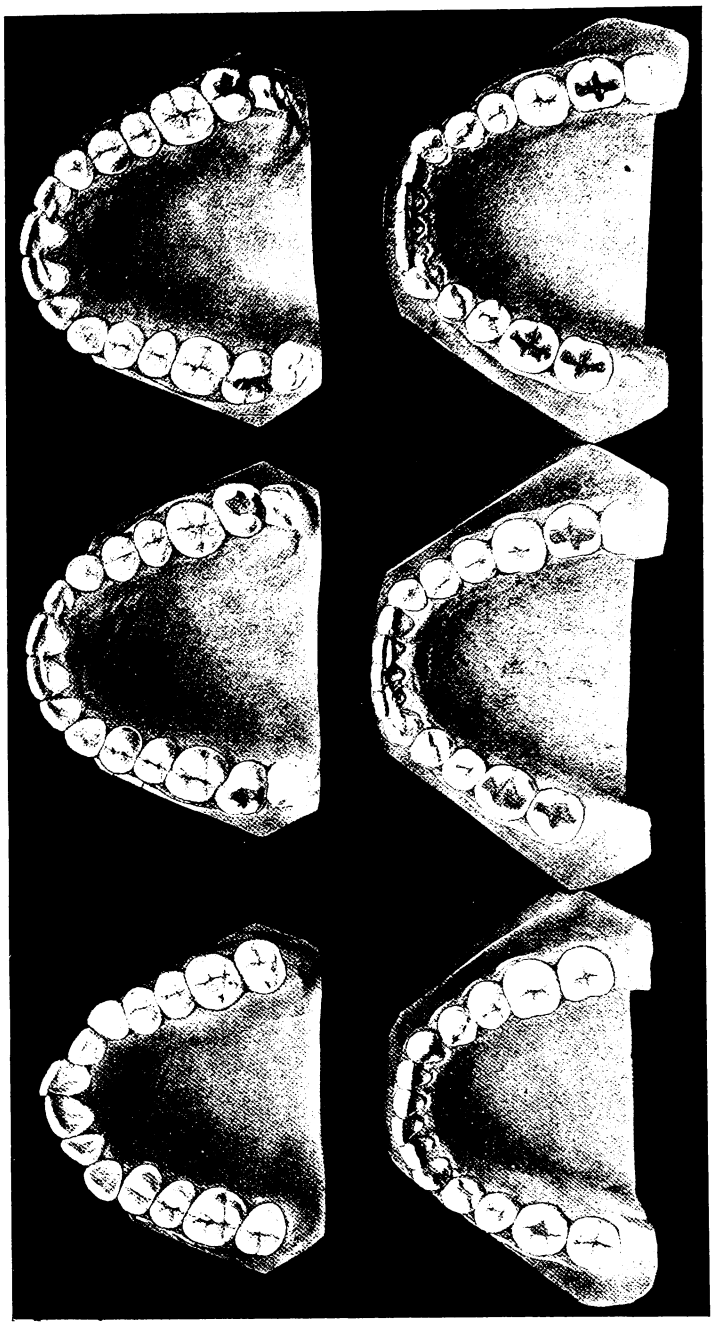
When the fossa is filled until nearly obliterated, the point of the occluding cusp hammers in the centre of the restoration. More stress is placed upon the walls of the tooth than if the fossa was of normal depth.

Some operators advocate a shortening of the cusps, especially in a pulpless tooth, so that when in use they do not touch the occluding teeth.

Think how empirical this practice is when compared with that of restoring shortened tooth cusps to normal length, form and function by the restoration. Some orthodontists are just as ignorant of tooth forms as the operative dentist, and when they place the teeth in occlusion allow bands to partly cover the cusps of some of the buccal teeth, and in cementing these fill the fossae full of cement, so that the teeth cannot settle into normal positions.

Interest of Orthodontists in Dental Restorations.

The orthodontist is vitally interested in the subject of anatomical restorations. In a case where originally the arches were constricted and in treatment the buccal teeth have been brought out into harmony with the line of occlusion, where they may

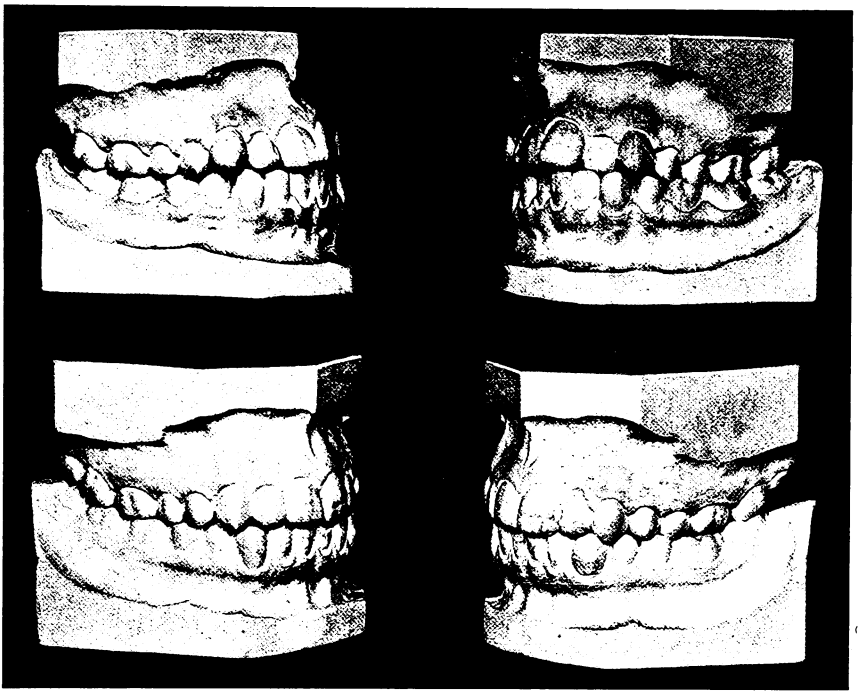


September 7, 1909.

Fig. 12.
July 6, 1913.

September 16, 1913.

settle until locking of the cusps in occlusion retains the case, if the fossae of the buccal teeth have been obliterated by flat restorations, the teeth will slip and slide over these restorations back toward their former positions of malocclusion, and in cases where the mandibular teeth have been distal or mesial to normal they may slip toward the former malocclusion.



Upper casts, Sept. 7, 1909. Fig. 13. Lower casts, July 6, 1913.

Cases from Practice.

The case illustrated in Figs. 12 and 13 emphasizes the point just made; by the first set of models you will see the depth of fossae and length of cusps before the teeth were filled, and note that the buccal teeth upon the left upper side were in lingual occlusion. The second set of models in Fig. 12 shows the teeth after the maxillary arch was expanded, and in the meantime some of the usual flat fillings have been inserted. You will note that in the upper second molars, especially the one upon the left side, the surface of the inlay is convex; of course, such a restoration does not permit the second molars in erupting to fully lengthen and settle into occlusion. The third set of molars show these

inlays and fillings after they have been carved with small inverted cone and bud-shaped burs, and minute cavity finishing stones in the engine. Such a procedure, however, is not recommended, as it is impossible to do the carving as well in the gold as it may be done in wax or amalgam: then, too, the bottoms of the fissures are left rounding instead of at a

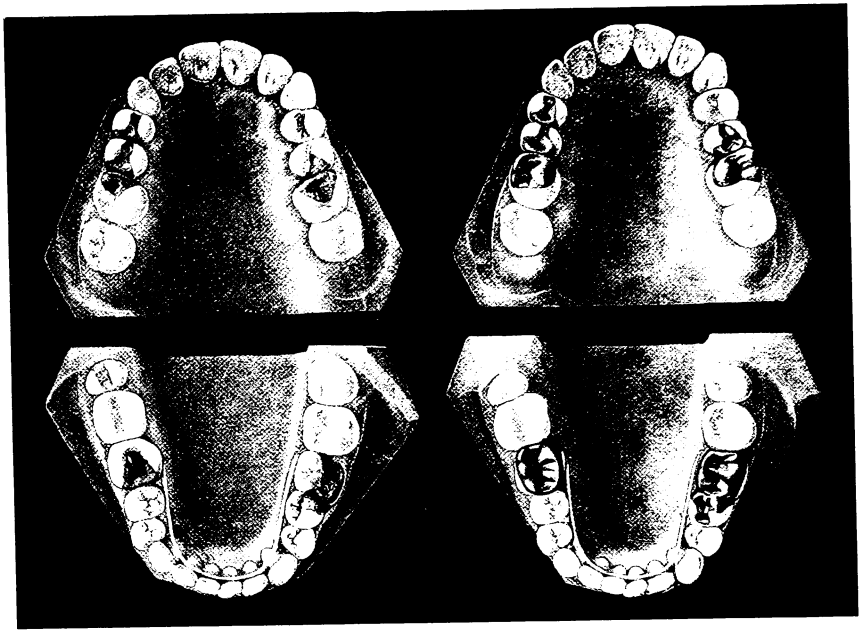


Fig. 14. Fig. 15.

NOTE—The second and third lower molars are sound teeth, but models are poor.

sharp angle, as in the natural tooth. This rounding shape retains some starchy foods in the fissures; then there is liability of uncovering the cavity margins; but I think you will agree with me that the condition as shown in the third set of models is much better than that in the second. In fact, the patient reports that the grinding of food has been very materially improved by this procedure. The left upper first molar has given much trouble during retention by slipping lingually over the flat inlay which filled the lower first molar fossa almost level with the cusps. The lingual cusps of the upper molar have been worn from striking the lower molar in malocclusion, so when the retaining band on this tooth may be safely removed these cusps must be restored and the mesio-lingual cusp shaped so as to lock in the lower molar fossa when the teeth are in occlusion.

Models of a case in which the orthodontist produced great expansion of the arches are shown in Fig. 14. The patient was referred to the essayist for removal of the retainers. Observe the abraded molar cusps as shown by the first molars, also the flat inlays. In this condition these teeth would not lock and would soon return, at least part way, toward

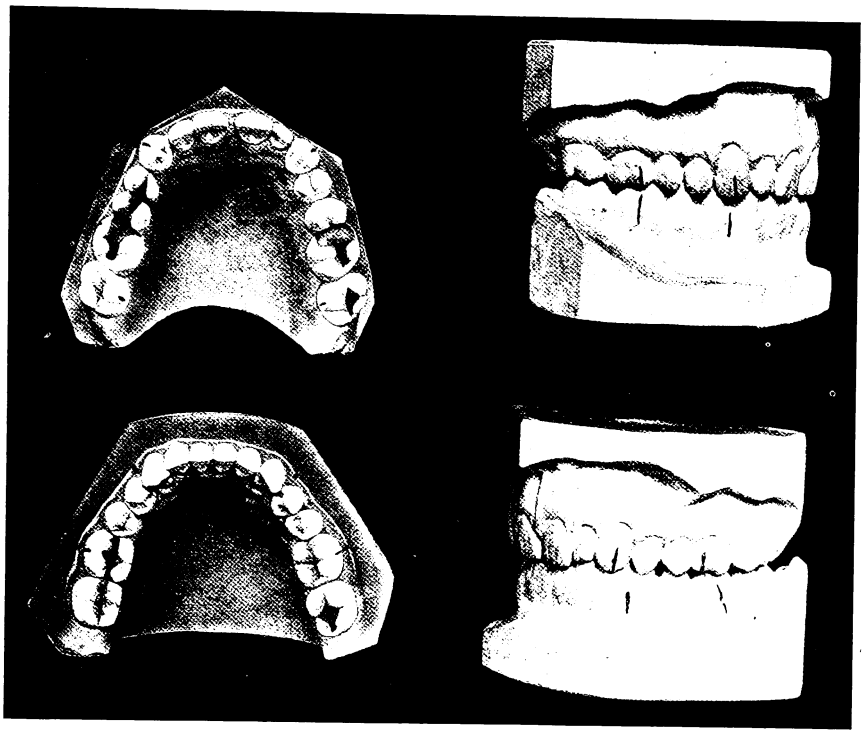


Fig. 16.

their old positions of lingual occlusion. The young man's dentist (Dr. L. B. Morris) was asked to construct anatomical restorations. The result is shown by the models in Fig. 15. You will notice that the mesio-buccal cusps of the upper first molars—especially the one on the left side—have been built rather long. It was fully expected that these would occasion some discomfort in the lateral movements of the mandible, but the day after insertion the patient reported that the restorations "are as comfortable as old shoes—I can eat with them just fine, but cannot remember the time when I could masticate my food well before this."

Observe the lack of approximal ridges in the inlays in Fig. 14, the occlusal surfaces slanting toward the approximal spaces, thus forcing food away from the grinding surfaces of the teeth on to the gum septum

between the teeth. Compare with these the new restorations in Fig. 15; notice the high approximal marginal ridges with the inclined planes slanting toward the occlusal surfaces of the tooth. Think what this means in forcing the food away from the approximal space toward the *mill,* where it may be properly prepared for digestion. Right here is a great lesson in efficiency, and one which will appeal to every intelligent patient.

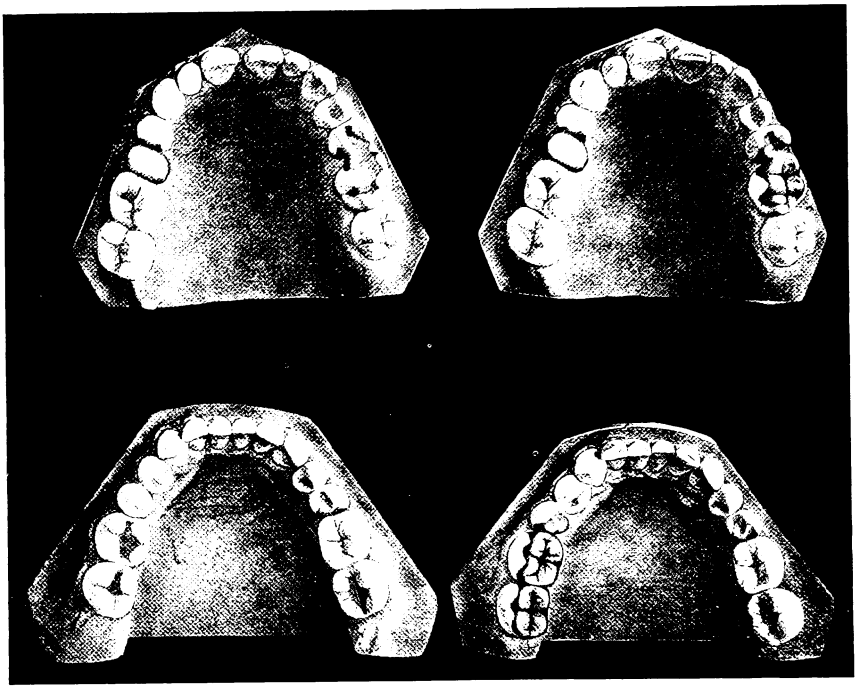


Fig. 17.

The operative dentist by inserting flat fillings may not only undo the work of the years which the orthodontist has spent to put teeth in occlusion, but in a normal mouth may induce malocclusion by making it possible for the teeth to slip and slide over the flat surfaces.

The essayist can speak feelingly upon the subject of flat fillings, for he has had personal experience. Fig. 16 shows models made twelve years ago. Upon the left side of mouth the buccal teeth are in end-to-end occlusion, while upon the right side the teeth are in normal occlusion. At the time when this model was made the left upper first molar contained a mesial-occlusal gold foil filling, which had been hammered to place by an exceptionally skillful foil worker. You will notice that the mesio-buccal cusp of this tooth had been left short. Upon the

normal side the upper premolars and first molar contain foil fillings. These were made in the days when fillings were put in for the sole purpose of saving teeth, and little attention was paid to approximal contact and none to occlusion. As a result, food packed in between these teeth, causing absorption of the gum tissue. The models on the left in Fig. 17 show the condition of these teeth in 1913. Since the first models were made special attention has been given to the contact point, therefore the

Fig. 18.

restoration in right upper second premolar was built out to closely touch the foil fillings in adjoining teeth. Notice the shape of the occlusal surface of this restoration. You will see there is a high ridge where there should be a fossa. This is caused by the inlay wax pressing between the occluding teeth when closing the mouth in the first stages of preparing the wax pattern. You will notice that the cusps of these teeth are quite long. Now notice the buccal cusp of the right lower second premolar. It has been shortened, not from wear in use, but by grinding. This was done so that the long cusp would not pack food between the upper teeth. This shows quite plainly our empirical knowledge in regard to occlusion, to cusp length, and angle of inclined planes in relation to occlusion. You can see that in lateral motions of the mandible in dividing food that this cusp does not touch and is of no use excepting in up and down motions of the jaw.

The models on right of Fig. 17 show the condition of the buccal teeth on left side of mouth after an attempt to restore the occlusion with anatomically carved inlays by Dr. Lynn Mathews. I want to make the point clear that we cannot correct malocclusion with anatomical restorations, but sometimes we can improve the occlusion.

The efficiency of the left molars (Fig. 18) has been improved until they are nearly as good as those on the right, but as the premolars occlude end-to-end they have been improved but little. As soon as time will permit, all the fillings and inlays upon the right side of the mouth will be replaced by anatomically carved restorations. Notice on the right side of the mouth, the lower first molar is not mutilated; that it has never needed a filling.

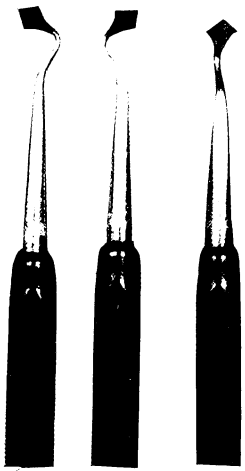


Fig. 19.

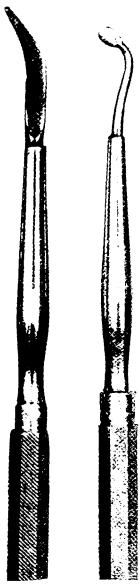


Fig. 20.

Technic.

I have pointed out the advantages of shaping restorations to reproduce the lost occlusal surfaces of the teeth, and this paper would be incomplete without giving the technic for carving, which may be mastered with a little study and application, so that the cusps, ridges, fossae and fissures may be reproduced accurately, easily, and quickly, either in wax or in amalgam.

Two good papers have recently appeared upon the carving of amalgam fillings, one by Dr. Wm. R. Pond, in January, 1914, ITEMS OF INTEREST, and one by Dr. Frederick Frahm, in April, 1914, ITEMS OF INTEREST.

I have been unable to find carving instruments on the market which will do this work either in or out of the mouth, accurately, easily and quickly. Fig. 19 shows a set of instruments designed by Dr. Frederick

Frahm, of Denver. They consist of three cutting instruments, all having the same kind of flat, two-edged blade, but with the shank bent at different angles, one right, one left, and one with the blade in the same plane as the shank. These in the illustration have cutting edges meeting

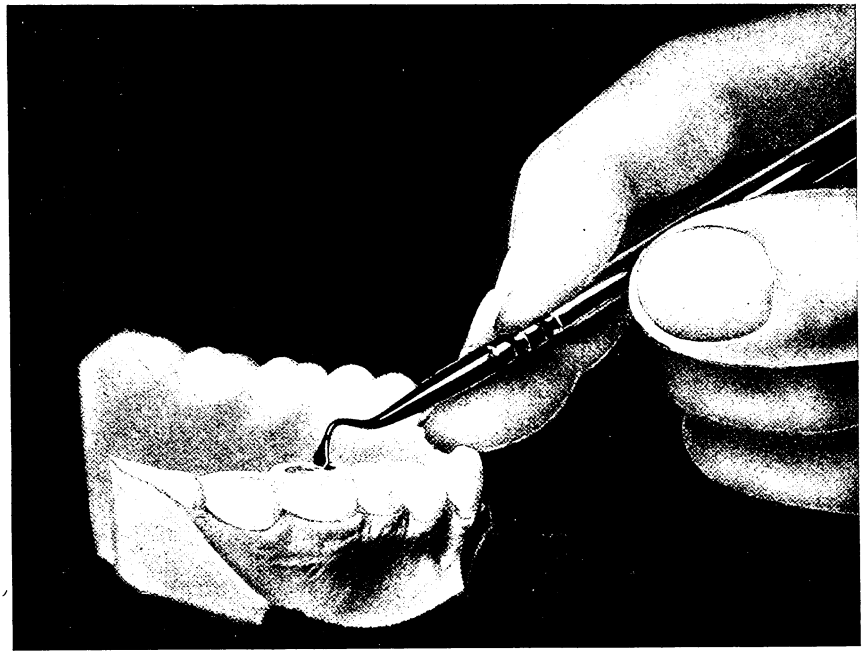


Fig. 21.

at an angle of ninety degrees. This angle is of the greatest use, as more teeth are found with the occlusal inclined planes which slant toward the fossae, meeting at this angle, than at any other. The complete set consists of nine instruments, the other two sets differing from this only in that in the first the edges of the blades meet at an angle of seventy-five degrees, and in the third they meet at an angle of one hundred and five degrees.

The technic of using these instruments, whether in the mouth or upon the model, is as follows: In the case of the lower first molar, with a restoration filling the fossa, select the straight instrument, holding as illustrated in Fig. 21. Place the blade opposite the point where the buccal fissure joins the central fissure (*a* Fig. 22); the instrument is imbedded in the wax or amalgam to full depth of fissure. Draw the instrument for-

ward, both inclines of blade cutting to full depth and width of fissure, until the anterior occlusal fossa is reached (at *b*), then take either right or left instrument, according to position of tooth, place it in the fossa end of the buccal fissure (*a*), pass toward buccal side with blade following line of the fissure and buccal groove, raising as end of fissure is reached at (*c*); then take the straight instrument again, place in centre of occlusal fissure and cut diagonally backward and lingually to the point of junction of lingual fissure with central pit (*d*); then selecting either right or left instrument cut lingual occlusal fissure same as buccal (*e*). Now take straight instrument and cut from lingual pit (*d*) distally to the juncture of the distal with the disto-buccal fissure (*f*). Then to finish

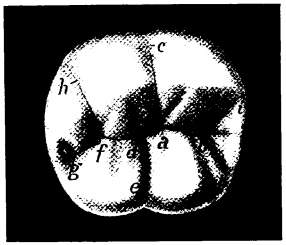


Fig. 22.

these select a right or left instrument, according to position, placing instrument in distal pit (*f*) and cut buccally and then lingually to points *g* and *h*, keeping one edge of cutting blade resting upon cavity margin, or, in the case of a compound filling, upon the matrix; or, in the case of a wax inlay, it may be held at just the right angle to cut and leave the proper height distal cusp. To finish the mesial marginal pit, use right and left instruments, cutting buccally and lingually from centre (*b*) of pit to *i* and *j*. After this the supplemental developmental fissures are put in by sidewise pressure of the instrument. The occlusal surface of the wax is left smooth and polished by these instruments, which are used cold. In using these instruments on an occlusal surface, begin to cut in a pit and end in a pit, raising the instrument if going over a ridge. In finishing buccal and lingual fissures decrease pressure as instrument approaches end of fissure. In premolars start in one pit and cut toward triangular ridge, releasing pressure when passing over the ridge, then increase pressure toward other pit, either with draw or push cut. Finish marginal ridge and pits same as in lower molars. In carving restorations in the upper molars, the same technic prevails, only modified for the anatomy of the tooth. No subsequent polishing of the filling with a rotary cutting instrument is permissible. In fact, the only finishing that

is needed is burnishing with a tantalum instrument, which is harder than steel One of these (Fig. 20, Right) is recommended by Dr. Young, and the other is a regular synthetic cement burnisher. The latter may be used with a forward and backward motion in burnishing the bottom of the fissures.

If there are tiny bubbles of gold in the fissure they may be trimmed with an S. S. White No. 48 chisel, which should be kept very sharp. If any portion of the inlay is high it must be upon the cusps or ridges and is easily trimmed. Right here a great deal of time is saved, for with

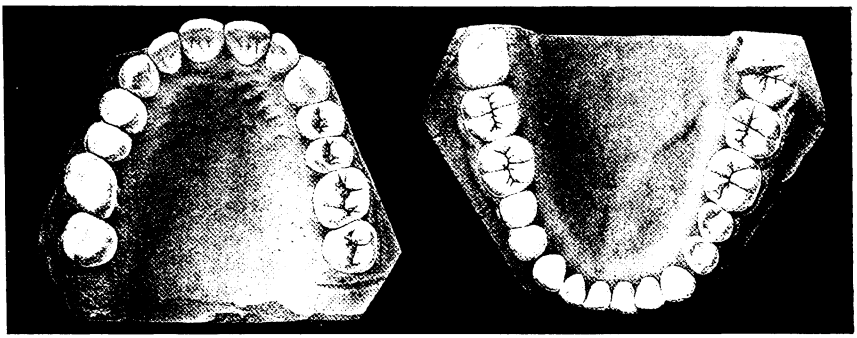


Fig. 23.

flat inlays often considerable time is spent grinding until low enough. Besides, the usual time spent in polishing a flat filling is also saved. In the case of amalgam fillings, Dr. Frahm believes that the carving should be finished before the amalgam sets enough to admit a squeaky sound beneath the instrument. This leaves the amalgam with a dull burnished surface. After it is hardened it may be gone over with the carving instrument and burnished fairly bright. These instruments are not on the market and when first used by an operator unfamiliar with the technique seem rather strange. Dr. Frahm made a set for the writer. These have been loaned to a number of dentists, who at first looked at them in a rather doubtful way, but after a few days' use they have felt they could not do without them, and have persuaded Dr. Frahm to make other sets.

Carving Wax Inlays.

In regard to carving inlay wax: I am aware there are two methods of making inlays, one called the direct, from the fact that the inlay wax is prepared in the tooth cavity, then removed and invested; the other is called the indirect method, from the fact that the inlay wax is prepared in a model of the cavity. One of my friends follows the direct method, but after removing the inlay wax from the tooth cavity,

sometimes invests only the cavity side of the wax pattern; then after removing the sprue wire from the occlusal surface shapes that surface automatically; then placing a small sprue wire on the approximal surface or the tip of a cusp, finishes the investment in the flask. This works fairly well for small restorations, but is inaccurate in large restorations as one does not have the occlusal surfaces of adjoining teeth as a guide. I asked the doctor to place two sprue wires not over one-fourth inch in

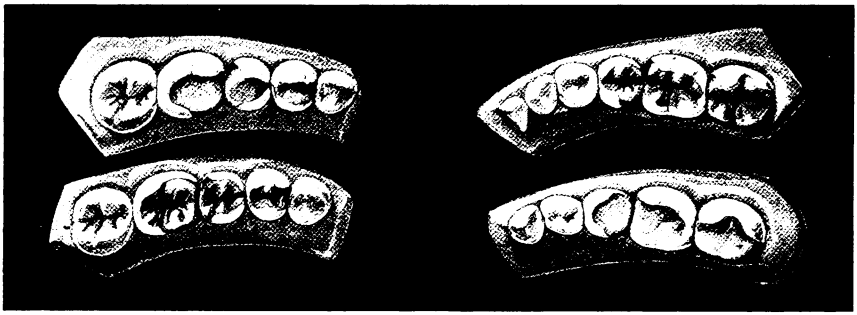


Fig. 24. Fig. 25.

Lower jaw teeth.

Old amalgam fillings replaced by new amalgam fillings.

length in the occlusal surface of the wax in a M. O. D. cavity, then to take a plaster impression. He followed my suggestion and the inlay wax was removed in the impression. I varnished the impression the same as for an orthodontia model, first giving it a coat of thin shallac varnish—being careful not to touch the inlay wax—which fills the pores of the plaster and acts as a primer, or as a first coat of paint on wood. After this was dried another coat of shellac was applied, which left a dull, glossy surface. When this was hard, a thin coat of sandrac was added. This left a glossy surface, yet the varnish was not thick enough to destroy the fine detail of fissures, fossae, ridges and cusps on adjoining teeth Then the model was poured with the regular investing material. This was allowed to harden thoroughly, then the impression was removed in small pieces. A modelling compound bite had been taken which gave both the upper and lower teeth on that side in occlusion. Models were poured and allowed to extend beyond the anterior and posterior ends of the bite, so that when the model was separated from the compound impression the surplus plaster at the ends was fractured. By observing the fractured lines the models were put together in their correct relations. By noting the occlusion of the teeth in the bite models, then placing the models of the occluding teeth on the model of investing material, in exactly the same relation that it occupied on the bite model, then placing both in a

crown and bridge anatomical articulator (in this instance a Kerr), the inlay wax may be carved and occlusion noted accurately. The essayist has found that when taking a bite in wax or modelling compound, as a guide for the placing of two models together, that it is impossible to crowd the occluding models which have been made down into this bite.

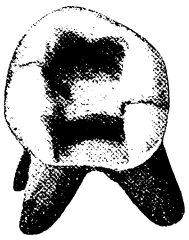


Fig. 26.

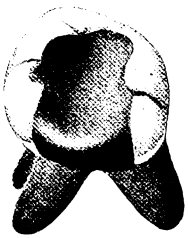


Fig. 27.

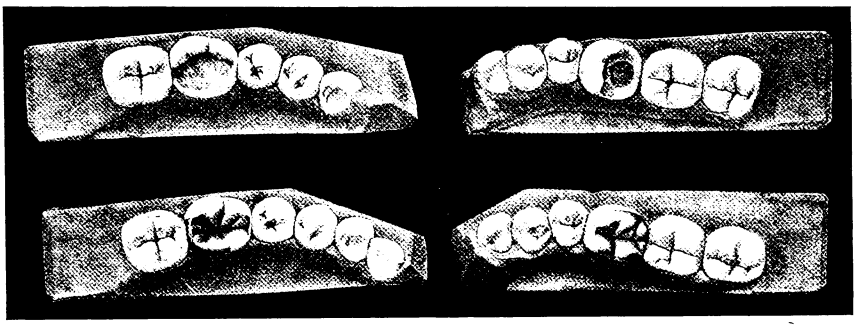


Fig. 28.

Therefore, he suggests this way out of the difficulty, though he feels that this technique can be greatly improved. After the inlay wax is carved the investment material model is soaked in water, then the model cut down until only the tooth holding the inlay wax remains. The surface of the investment material is well roughened and fine sprue wires placed, either in the approximal surfaces or on the tip of a cusp, or both, then invested in the usual manner.

The essayist believes that after experience with Dr. Frahm's instruments in carving amalgam in the mouth, that the operator will soon develop his technic to a point where he will carve his wax patterns accurately in the mouth, thus saving time.

Models for Carving Technic.

Practice in carving will quickly improve the operator's technic. The essayist suggests taking impressions of mouths where the surface of the teeth upon one side of the mouth are normal; then the occlusal surfaces of the teeth upon the side which

least approaches the normal may be scraped smooth in the impressions, then models made as shown in Fig. 23. In carving the mutilated tooth cusps the operator has the normal teeth as a guide. The right lower first and second molars on the models in Fig. 23 have been carved, using the corresponding teeth on left side as a guide.

Amalgam fillings as they are usually contoured by the so-called good operator are shown in Figs. 24 and 25, which are models, lower, from the right and left side of a mouth, which afterwards was treated by Dr. Frahm with the result shown.

One of the clinics at the Colorado State Dental Association meeting in 1913 was a gold inlay by Dr. E. I. Backus, of Colorado Springs. This inlay, just as he cast it, without being polished, is shown in Fig. 26. Shortly after the synopsis of Dr. Young's paper was given in Colorado Springs last fall, Dr. Backus made the anatomical restorations shown in Fig. 27 for this same cavity.

Broken-down lower first molars and their restoration to normal form and function by anatomical inlay restorations are shown by Fig. 28. These, also, are the work of Dr. Backus.

The essayist wishes to acknowledge receipt of models of restorations to illustrate paper and clinic, from:

Dr. R. A. Adams, Denver, Col.
Dr. E. I. Backus, Colorado Springs, Col.
Dr. A. B. Brusse, Denver, Col.
Dr. M. Catlett, Denver, Col.
Dr. W. T. Chambers, Denver, Col.
Dr. F. W. Frahm, Denver, Col.
Dr. J. L. Howell, Denver, Col.
Dr. L. D. Mathews, Denver, Col.
Dr. L. B. Morris, Denver, Col.
Dr. C. P. Strawn, Denver, Col.
Dr. J. H. Setzler, Fort Collins, Col.

The Dental Hygienist in Public Institutions.

By A. C. Fones, D.D.S., Bridgeport, Conn.

Read before the Second District Dental Society of the State of New York, January, 1914.

It seems hardly necessary to present additional arguments to prove why the dental profession must in some practical manner solve this universal problem of decayed teeth and unsanitary mouths. For the past few years our dental literature has teemed with articles on the evil results of unhygienic mouth conditions, and of late, since scientific investigations have been made of the systemic infections from pyorrhea alveolaris and blind abscesses, the necessity of adopting some definite, practical plan to prevent at least a portion of this great evil must be plain to all. And when we say great evil, we might truly say the greatest evil, for there is nothing in our civilization that is the cause, either directly or indirectly, of so much sickness as decayed teeth and unclean mouths.

Tuberculosis.

The next great advance in the elimination of tuberculosis will be made through the dental profession. The majority of mouths with their surfaces of congested and bleeding gums present an ideal culture medium for the tubercule bacillus. Add to this the lowered resistance of the body, induced by the lack of power to properly masticate food, and the poisons generated in these unsanitary mouths with decayed teeth and decomposed food, and we find an interesting pathological combination that seriously prevents the medical profession from making any further great reduction in the mortality from this disease.

Sociological problems, such as alcoholism, vagrancy, poverty, crime, viciousness, waywardness, will be solved chiefly by the correction or prevention of physical defects in early youth, and as the mouths of practically all children contain decayed teeth, the work of correction and prevention must start there. Most of the diseases of childhood, scarlet fever, diphtheria, mumps, measles, whooping cough, tonsilitis, etc., are preventable. With a well-planned campaign among the children in our public schools for clean mouths and sound teeth, and teaching the importance of cleanliness and of keeping practically everything out of their mouths except food, drink and the tooth brush, the sick list would shrink perceptibly. What is the use of teaching a child where the Mississippi River rises, or how many miles long it is, when we are letting his body go to pieces? Many a person has secured an education after twenty years of age, but none can secure a new body after it has been neglected and defective for twenty years.

Influence of Caries Upon Health.

Here we find the seedlings of our future civilization with their temporary teeth full of cavities, food decomposing in these cavities and around the teeth, and green stains covering the necks of the teeth. Many of the children are able to eat only on one side of the jaw, because the teeth are so sore, or decayed, or entirely lost through decay, that but one side is available for use. In some cases both sides are wrecked as early as six years of age.

We all know what this lack of power to properly masticate food will do. Dr. Lawrence W. Baker, of Boston, has shown by experiments upon rabbits that the proper development and expansion of the cranium in early life is dependent in no small degree upon the use of the muscles of mastication. These muscles cannot exert their tension or pull on the bones of the cranium until the teeth are placed together, and if in a child's mouth the teeth are badly decayed or sore on one side, so that the chewing is done on the opposite side, the cranium is unequally developed. It can readily be seen how this will influence unequal brain development and how important it is that the temporary teeth of the child be cared for in its early life by the parents. We also know what it means to the child's digestive tract, as well as to his whole nutritive system, to have the millions upon millions of germs incubated in his unclean mouth, mixed with the food and swallowed. The most powerful poisons known to scientists to-day are those generated by bacteria. Abbott, in his book on the *Principles of Bacteriology*, states that Roux and Yersin found that the potencies of the poisons generated by the bacteria of diphtheria have been determined upon animals and that 0.4 milligrams would kill eight guinea pigs. When it is considered that 0.4 milligrams represents about 1/160 part of a grain, we can understand what it means to the resistive forces of our bodies to have the products of the millions of bacteria in unclean mouths constantly being swept into the system.

In the brain centres, where the five senses record their impressions, there is a decided interference with the proper functionating of the brain cells, due to these pernicicus mouth conditions. Not only through the nutritive system, but also from the discordant vibratory impressions playing upon these centres from sore and aching teeth, sharp edges of cavities irritating the tongue, congested and bleeding gums, alveolar abscesses and temporary teeth pushed out of position by the erupting permanent teeth.

Who does not know how disturbing it is to try and hear through the telephone when there is a slight buzzing on the wire, or how difficult it is to concentrate one's mind on a book if some one is whispering in the room? If impressions on the brain are to be properly received the body

must be sound and normal. These defective physical conditions produce abnormal thought and abnormal action. We think little of it in the child, but as the twig is bent so the tree is inclined. In adult life these abnormal thoughts and actions are gradually magnified until the young man or woman becomes a menace to society. The lack of power to properly masticate one's food means the lack of a proper stimulus from the food ingested, and in adult life there comes a craving for an artificial stimulus, the satisfaction of which is usually found in the use of alcoholic drinks. Examine the mouths of the inmates of our reformatories and prisons and see in what a deplorable condition they will be found. And the same holds good in the State sanitoriums where the tubercular patients are segregated. Much could be prophesied for the future if one-quarter the attention were given to the child's body that there is to the development of its brain, but as the time is fast approaching when this will be done, the results will prove themselves without the need of prophecies.

Nearly all our efforts in life to do good are palliative. We do not get at the source. Analyze the working of most of our charitable organizations, and we shall find that they are toward the relief of some evil already developed and that is constantly developing, but no effort is made to kill its growth at the start.

If our work is ever to prove effective in securing clean mouths and sound teeth, we must go back to the very source where the evil originated, where we find the beginning of most of our troubles, in the mouths of the children of the first grade in the public schools. It is here that we must concentrate our efforts and care for each child through the first five years of its school life.

Bridgeport School Clinic.

It was fully four years ago that our first efforts were made to interest the public officials of Bridgeport sufficiently to permit us to establish a dental clinic for the children in our public schools. All who have made a like effort know how slow and difficult it is to gain permission to enter the schools and to secure a public appropriation for work of this kind. It is unnecessary to go into detail here as to how this was finally accomplished, but at last an appropriation of $5,000 was in sight and the prospect of a start of a preventative dental clinic was encouraging.

The Fones School for Dental Hygienists.

It now became necessary to educate a number of women in preventative dentistry, as the clinic in the schools was to be conducted by women, and an educational course for them was essential. In the early fall of 1913 an effort was made to secure a list

of lecturers who would come to Bridgeport and deliver lectures before a class of women. These lectures were to be taken down in shorthand, typewritten, sent back to the lecturers for correction and later published in a book to form an educational course for women who were to be known as Dental Hygienists. These women were to be educated to work in private offices, schools, sanitariums, hospitals, or anywhere, under the supervision of a dentist, where their services were most needed. After seven weeks of solicitations and interviews, the following generously agreed to lend their aid, without compensation, to start this work:

Lecture Staff.

Raymond C. Osburn, Ph.D., Professor in Barnard College, Columbia University.

Leroy S. M. Miner, M.D., D.M.D., Assistant Professor in Surgery, Harvard Dental School.

Alexander M. Prince, M.D., Instructor in Medicine and Physiology, Medical Department of Yale University.

L. F. Rettger, Ph.D., Assistant Professor of Bacteriology, Sheffield Scientific School of Yale University.

R. H. W. Strang, M.D., D.D.S., Bridgeport, Ct., Specialist in Orthodontia.

Dr. George M. MacKee, Instructor in Dermatology, College of Physicians and Surgeons.

Dr. C. Kirk, Sc.D., D.D.S., Dean of Dental Department, University of Pennsylvania.

Eugene H. Smith, D.D.M., Dean of Dental Department of Harvard University.

M. L. Rhein, M.D., D.D.S., New York City.

R. G. Hutchinson, Jr., D.D.S., New York City, Specialist in Treatment of Pyorrhea Alveolaris.

R. Ottolengui, M.D.S., New York City, Editor of ITEMS OF INTEREST.

C. M. Turner, M.D., D.D.S., Professor of Mechanical Dentistry and Metallurgy, School of Dentistry, University of Pennsylvania.

Russell H. Chittenden, Ph.D., LL.D., Sc.D., Director of Sheffield Scientific School of Yale University.

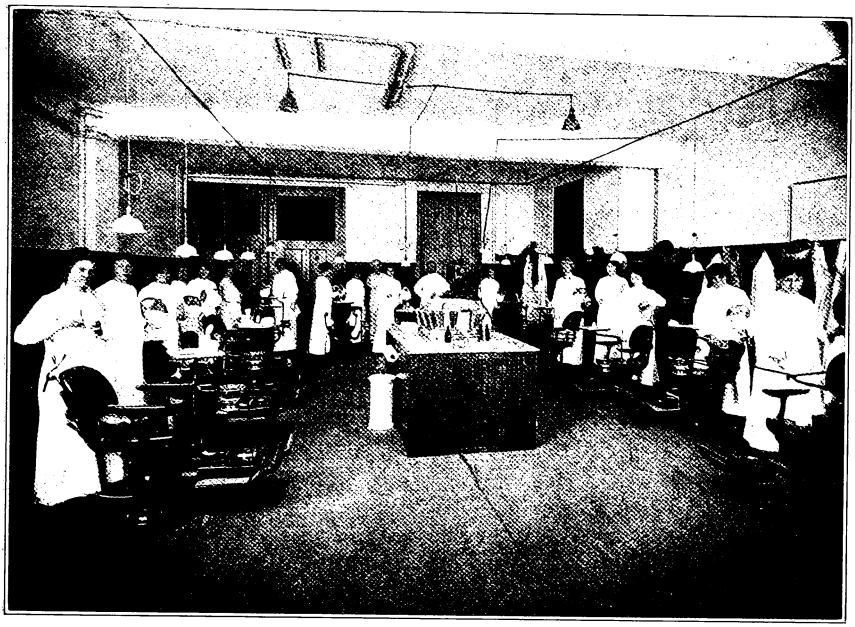
M. I. Schamberg, M.D., D.D.S., New York City, Specialist in Oral Surgery.

H. E. S. Chayes, D.D.S., New York City.

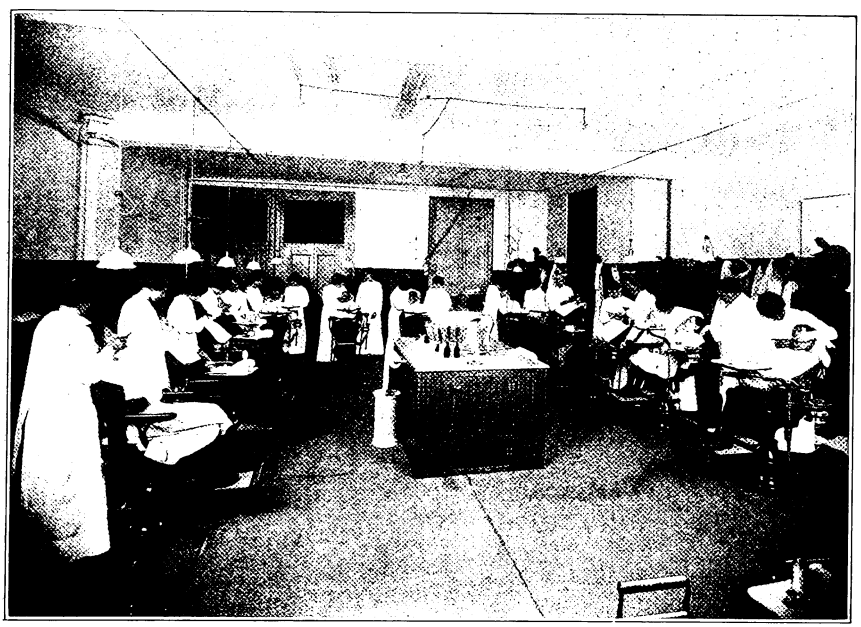
C. Ward Crampton, M.D., Hygienist and Director of Physical Training, Public School System, New York City.

Professor Irving Fisher, of Yale University, Chairman of Committee of One Hundred on National Hygiene.

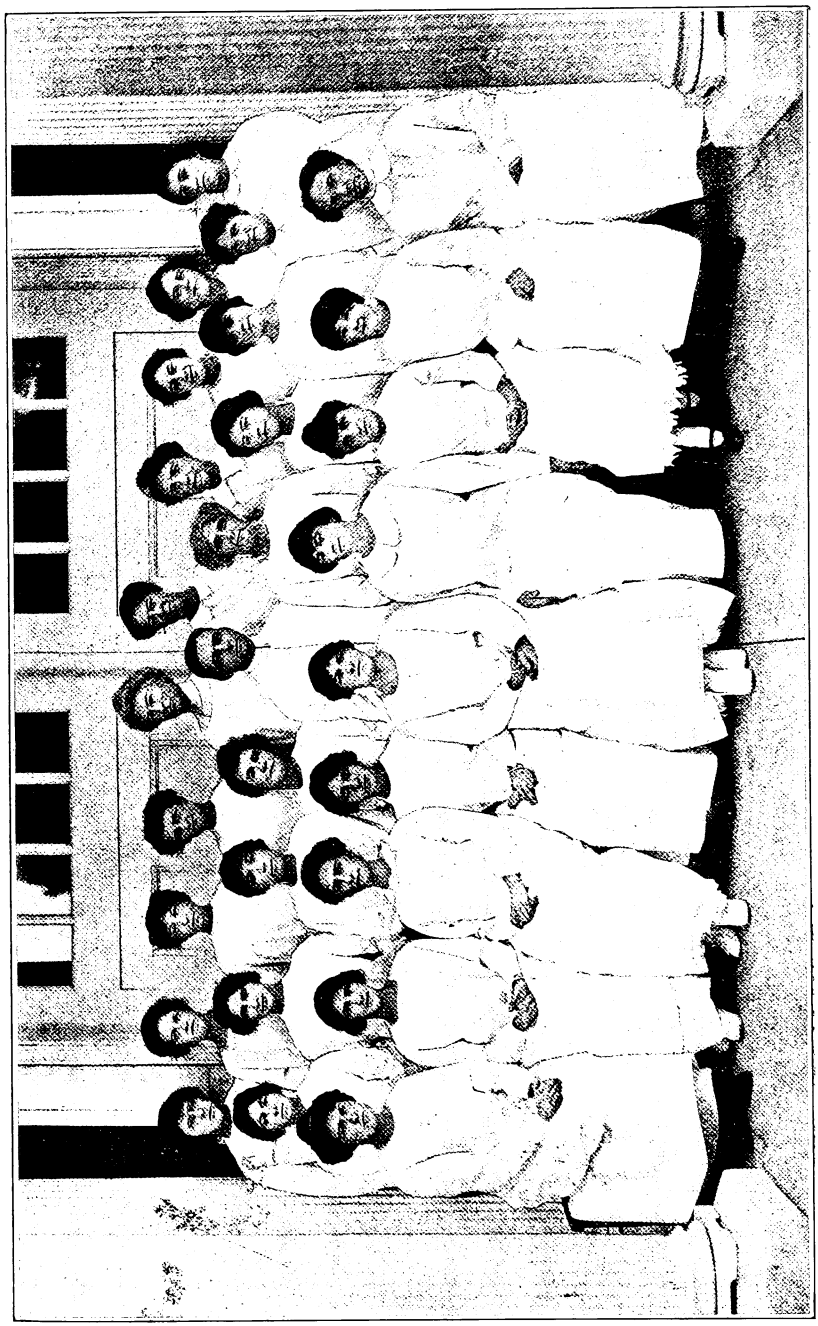
Dr. William G. Anderson, Professor and Director of Yale University Gymnasium.



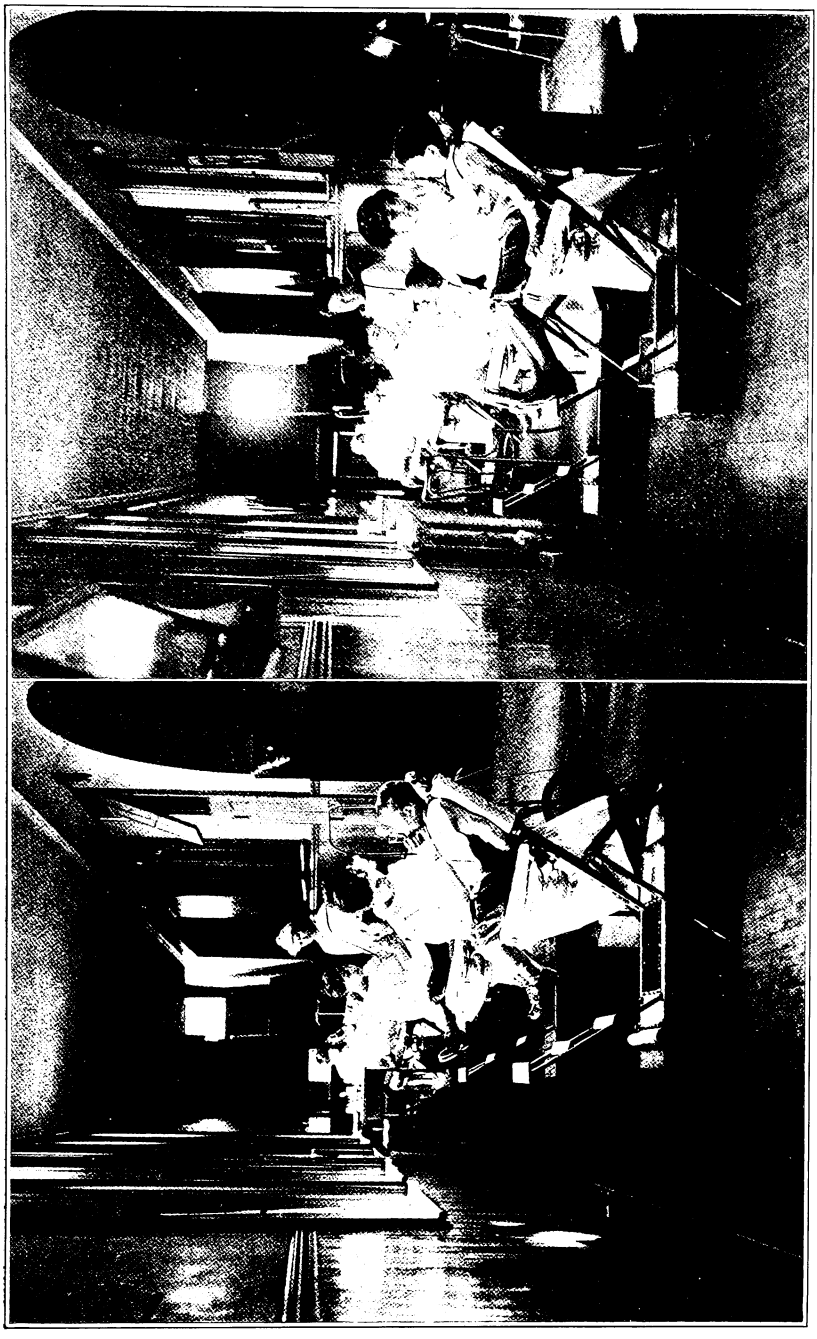
The evening class working upon manikins.



The evening class working upon children.



Graduating class, June 5, 1914.



Supervisor Miss Rose E. House with her dental corps in Waltersville School, Bridgeport, Conn.

Supervisor Miss Hubert Hart with her dental corps in Waltersville School, Bridgeport, Conn.

Thaddeus P. Hyatt, D.D.S., New York City.

Miss Cordelia L. O'Neill, Principal of Marion School, Cleveland, Ohio.

Alfred C. Fones, D.D.S., Bridgeport, Ct.

Announcements were sent out to the dentists throughout the State and to medical nurses, as well as notices published in the papers. A class of thirty-two women was formed—the practical course not permitting of a larger class—and on November 17, 1913, the first lecture was given. The garage in my office was turned into a lecture room and the entire course, even to our commencement, was held in this room.

PROPERTY OF DENTAL LIBRARY UNIVERSITY OF MICHIGAN DON'T MUTILATE OR REMOVE

The lectures were held in the evenings on Mondays, Wednesdays and Fridays, and aside from a vacation period at Christmas time were held weekly from November 17th until March 30th. The class assembled at 7:30 and a quiz master reviewed one of the previous lectures for a half hour. At eight o'clock the lecturer of the evening stepped upon the platform and lectured until 9:30. Examinations were held upon the various subjects and at the end of the lecture course it was found that all but six had passed above 70 per cent.

On April 8th the practical course was started, the room now being converted into an operating room. The S. S. White Dental Mfg. Co. very kindly loaned us sixteen now Diamond chairs, and with an improvised sink and drop lights and sixteen manikins, the class was ready for practical instruction. It was divided into two sections, one for afternoon and the other for evening instruction. Time and space will not permit of my giving the methods of instruction and training employed, but the full details will be found in the book, "Mouth Hygiene, A Course of Instruction for Dental Hygienists," now being prepared for publication by Lea & Febiger, of Philadelphia.

After the class showed a proficiency in handling their polishers and instruments on the manikins, work was begun on the children. Over five hundred children were given prophylactic treatments and instruction in brushing. We were obliged to turn many away, as the number applying for treatment far exceeded our capacity for handling them. Following the work on the children, over two hundred adults were given treatments and instruction.

Examinations were held during the progress of the work, and at the end of seven weeks the practical course was finished. Subsequent observations and testimonials have proved that the fundamentals of practical prophylaxis were obtained during this course.

On the evening of the 5th of June, 1914, a banquet and commencement was held in the same room. Dr. Edward S. Gaylord, of New Haven, Conn., acted as Master of Ceremonies, calling upon a number of

the lecturers who were present and some of the members of the class for speeches. Prizes generously donated by Drs. Ottolengui, Strang and Prince were awarded. At the end of the exercises a certificate was given to each graduate as an indorsement of her faithful work and study and the belief in her ability to practice as a dental hygienist.

Training of Hygienists for School Clinic.

We now had help for our public school work, and two women from the class were selected to act as supervisors. In July, 1914, another class was chosen, chiefly high school graduates, and through the summer lectures and practical training were given in this second class by Drs. R. H. W. Strang, T. A. Ganung, W. J. McLaughlin, and the supervisors, Mrs. Winnifred A. Hart and Miss Rose E. House. In September, when school opened, this corps of eight operators and two supervisors was ready to start work in the school buildings on the children of the first grade.

The Problem.

Before explaining our method of handling this preventive clinic, let us consider the proposition as a whole in order to better judge whether we are attacking this problem from a logical viewpoint or not. In almost all of our cities the children throughout the public schools will average about six cavities per child. In the city of Bridgeport, with its twenty thousand school children, we may closely estimate the number of cavities as 160,000. Even were wholesale extraction permitted, it would take a corps of twenty-five dentists two years to properly restore these mouths to a sound and healthful condition. Such an expensive charity is at the present time out of the question, for several reasons. First, our city officials do not as yet appreciate sufficiently the immense importance of the teeth to good health to be willing to appropriate such a sum. Second, unless it were followed by a definite system of prohylaxis in the schools, such work would be palliative only, and in a few years an equal number of cavities would again have accumulated. Third, until a greater interest in the care of their mouths is awakened among the children and their parents, the making of such operative work compulsory would cause much trouble. Fourth, it is a hopeless and endless task, for it does not stop the flood at the source, but merely repairs the damages after they occur. Let us then accept these facts as we find them, and admit that the task of filling all of the decayed teeth for the children is impossible.

The Possible Solution.

But can we not confine our efforts to the children of the first grade, where the permanent teeth are just erupting, and by giving these mouths a thorough prophylactic treatment four or five times during the school year, and educating the children by tooth-brush drills

and talks as to how to keep their teeth free from food, prevent the permanent teeth from decaying and save them the necessity of dental operations?

As they advance to the second grade a corps of dental hygienists will take care of them in their second year of school life. Again in the third year, and so on up to and including the fifth grade. A few additional women will be added to the numbers when needed, so that a child will have its teeth kept clean and polished during the first five years of its school life. If such a system is adopted we will have from the year it is started an army of children with clean mouths in the first grade advancing the next year to the next grade. Again this clean mouthed army will advance into the third grade and so on up to the fifth, pushing before them those who have innumerable decayed teeth. In five years' time practically all the children in the first five grades will have clean mouths and sound teeth. And if this education and training had meant all that it should, in eight years we would have all the children in all grades with healthy mouths, and the new-comers entering into a definitely formed system.

Work Accomplished by Eight Dental Hygienists.

Now possibly some of this sounds theoretical, but let us look at some facts and figures that may prove we are trying to be exceedingly practical. In the first round through our public schools the corps of eight dental hygienists cleaned and polished all of the teeth of the children in the first grade, and by working after school hours and on Saturday mornings for many of the children in the second grade. The following table will give an idea of the general conditions found in the mouths of the children of the first grade and a part of the second grade:

First Round.

TOTAL WORK FROM SEPTEMBER 8TH TO DECEMBER 12TH.

	Grade 1	Grade 2	Total
Pupils Given Prophylactic Treatments	3,826	840	4,666
Cavities in Temporary Teeth	21,432	4,092	25,524
Cavities in Permanent Teeth	1,575	742	2,317
Children with Malocclusion	2,697	768	3,465
Children Without Tooth Brushes	3,249	566	3,815
Fistulas Showing Abscesses	508	90	598

The relatively large number of cavities in the temporary teeth as against the small number in the permanent teeth will be noted. Also note the increasing numbers in the permanent teeth of the children of the second grade.

Here is a proposition within reason. If we can have a repair clinic to fill these permanent teeth of the first grade pupils and for any extractions of temporary teeth that are abscessed or need removing we can, in a comparatively short time, have a reasonably clean environment for the new permanent teeth that are erupting from six to twelve years of age. What new cavities would form in the permanent teeth in the next five years under this prophylactic care would be comparatively few in numbers, and could be easily taken care of by a small repair clinic. We would also provide for the relief of any child suffering from toothache and unable to pay for dental service.

On the 8th of September the work was started in our public schools, twenty-eight in number, and throughout them all we have been cordially received by the principals and teachers. The children have taken very kindly to the treatments and it has been our regret that we could not aid those in the higher grades who wished to have this service.

The hygienists work in pairs, as a rule, two remaining in the school until all of the children of the first grade are given treatments and some in the second grade also. It is our intention to give the second grade children one good cleaning during the year in order to have a fairly clean zone ahead of our first grade children.

The supervisors give tooth-brush drills, oversee the work, look after supplies and give class-room talks to the first and second grades. Each operator is supplied with an S. S. White portable chair, a cabinet, stool and dental engine, besides all of the necessaries for sterilization in their work. Their chairs are placed anywhere in the school where they are out of the way, have plenty of light and have running water. On stair landings, where they are deep enough to give ample room for marching lines; in the basement, if it is warm and dry and sufficiently light; in cloak rooms or in hallways, we can always find a place to put the chairs.

Educational Lectures.

Up to the present time, Dr. R. H. W. Strang and myself have given stereopticon lectures, using the acetyline gas lanterns, to over five thousand children in the third, fourth, fifth and sixth grades. About fifty-five slides are used in this first series of lectures, the last part being a demonstration in brushing the teeth and a distribution of pamphlets containing fourteen pictures illustrating the home care of the mouth. We have designed a portable outfit that can be readily transported to and from the schools and can be easily put in place in a short time.

As this educational work proceeds we will teach the children how to masticate their food, and, in teaching the proper use of the teeth, teach them the proper foods for their bodies. We believe that under such a

form of education the children entering the first grade will in a few years show a much improved condition of the temporary teeth. The lessons taught to the older children in school are taken home and should result in the parents giving more attention to mouth hygiene among the little children yet too young to enter school. A system of record charts is being kept showing the condition of each child's mouth. Examination blanks are sent home to the parents, with printed slips stating what we are trying to accomplish and asking for their co-operation. Tooth brushes are sold to the children at cost and it has been difficult to supply the demand.

Starting in on our second round of prophylactic treatments we were much encouraged to find in the first school that out of one hundred and sixty first grade children requested to bring their tooth brushes to school for another drill there were only six who failed to have them to bring.

In closing, I wish to say that this work in the school is chiefly woman's work. The children climb up into the dental chairs with but little fear, as they have confidence that the women will not hurt them. I doubt if this same trustfulness would prevaid if standing beside the chairs were eight men instead of eight women. There will never come a time in our civilization when there will be no decayed teeth, but there will come a time, and it is not far distant, when the majority, instead of the very small minority, will have mouths free from dental decay.

The New Gospel of Health According to the Dentist.

By Dr. Harold Clark, Toronto, Canada.

Read before the New Jersey Dental Society, Asbury Park, July, 1914.

When choosing dentistry as a profession I had many misgivings, fearing that I should encounter regrets when I had gone so far that the gate would be closed behind me. Fortunately, I had not practiced dentistry long before I knew my fears were unfounded. I soon discovered that I was engaged in a profession that was full of real achievement and opportunity for new achievement. How seldom does the dentist labor for his patient when he has not the consciousness that he has rendered him a positive service! The zest this gives to our work is a very real part of our recompense. By contrast, what a depressing task it must be for the physician to tell all that can be told when consulted by the victim of cancer, Bright's disease, epilepsy, or any of a multitude of maladies for which the achievement of centuries has been very little.

Up to about the year 1800, extraction was about the only cure for toothache. Now, instead of allowing the carious process to take its

course until the intolerable agony of it leads to the removal of the tooth, we can check the process, repair the lost tissue and restore the organ to its normal use. A look back on the development of the art and practice of dentistry reveals a most interesting and gratifying achievement. The brains, ingenuity and patient industry represented in amalgam, gold, porcelain, cast metal, silicate, and other fillings, and their value to mankind, are hard to realize even by the dentist himself. And then, when fillings fail, we have the various forms of crowns and bridgework. Where their application is consistent with good engineering principles, and sanitary requirements, what a boon they are to the wearer! Then there is the modern denture, whether of metal or vulcanite. What a blessing to the edentulous unfortunate! Many of us here have seen the full upper and lower dentures worn by George Washington, hewn out of solid ivory, and of great price. Compare the misery that must have been endured in their use with the comfort that can now be given with common vulcanite dentures, when these are made as well as they can be. The orthodontist, with his models and photographs setting forth the "before and after" of his work, almost figures in the rôle of a wizard, rearranging the irregular teeth, improving their efficiency for mastication, minimizing their susceptibility to caries, and giving them their maximum esthetic value.

These by no means represent the whole gamut of dental achievement; and yet, when we look at it all critically, our pride must surely take a fall. Is not our labor for humanity very like an elaborate system of "swatting flies" instead of removing their breeding places?

If all mankind, civilized and savage, present, past, and prehistoric, were all similarly afflicted with dental caries, the situation would indeed seem hopeless. We might be excused in taking it all for granted, and going on much as we are doing. The savage, however, who is untainted by the influence of civilization, has teeth that are as near immunity as civilized man's are far from it. If all civilized mankind were generally susceptible, we might still despair of doing anything more than improve our present methods. Or if immunity, on the one hand, were always associated with the highest degree of good health, and, on the other hand, susceptibility only found in those of low vitality and poor health, we might naturally assume that they were simply attributes or expressions of good or of bad health. But we all know that dental caries seems to obey no rule. We see one individual with generally good health, and yet with rampant caries; while another, with poor health, will be practically immune. Another person may seem to pass through periods of immunity and susceptibility. One individual may have a filthy, uncared-for mouth, and yet his teeth be immune; another, giving his teeth every

care, is constantly in the dentist's hands. We often see members of the same family show the extremes of susceptibility and immunity where we should expect similar heredity and similar environment to give similar conditions.

Phenomena of Dental Caries.

It is this very seeming paradox that seizes the imagination and suggests that there must be some elusive factor or factors in the phenomena of dental caries which, when discovered and understood, will explain the anomalous character of all these facts.

Already scientific investigation of this problem has made positive progress. We are all more or less familiar with the work of Tomes, Magitot, Milles and Underwood, Miller, Black, and others. Tomes laid the foundation of the knowledge of dental histology and tooth development. Magitot's conclusions made caries the result of the action of chemical substances developed in the mouth or introduced with the food. Milles and Underwood determined that the tubules in dental caries contained micro-organisms. Miller differentiated the various micro-organisms found in carious dentine and separated out those which, in the presence of starch and sugar, produce lactic acid. Also he showed that lactic acid dissolves out the lime salts of tooth tissue, and he was able, artificially, to produce dental caries outside of the mouth that was identical with the natural process within the mouth. His findings were approved and accepted by the scientific world, and even to-day he is credited with the discovery of the cause of dental caries. The acceptance of his enunciation of the septic origin of dental caries, and the dependence of this process upon carbohydrate débris in the mouth, led the dental profession into a campaign as wide as civilization of oral antisepsis and prophylaxis, in the hope of coping with dental caries. While the results of this propaganda may have made it well worth while, it has been disappointing, for there still remains with us the large unsolved problem of susceptibility. Black's investigations proved that immunity and susceptibility had no explanation in the hardness or softness of teeth. For a considerable time after Miller's theory had been accepted, the progress toward a further clearing of the mysteries of dental caries seemed to mark time. However, during the past ten or twelve years several valuable contributions have been made to the subject by various investigators. I shall refer to but two or three of them, as they will indicate what has been done recently, and the direction in which research is being made.

Influences of Diet and Force of Mastication.

J. Sim Wallace has written several valuable works. Among them are: *"Prevention of Dental Caries," "Modern Dietetics and the Causation of Disease," "Physiology of Mastication,"* and others. The dominant note in all his books is the paramount

importance of a diet requiring heavy mastication. He draws attention to the fact that although our civilization has lasted many generations, the countless generations that preceded it make its period seem almost negligible. He speaks of this earlier period as the "precibicultural" era, that is, the ages that preceded the cultivation of food, when man lived on such food as was ready to hand, much as did the animals about him. This era, in his evolution, probably fixed the relation between his alimentary organs and the character of the food they had to take care of. The effort of civilization to improve the order of the past seems to have resulted in disorder. This disorder, Wallace claims, commences in the diet of infancy. It is unnecessary to go back to prehistoric evidences to study primitive man. We find ample opportunities to learn of him in the aboriginal races we find to-day that are still unaffected by civilized conditions. An interesting and significant observation in the study of these people is that most of them have neither cows nor goats to give them milk, and when an infant is weaned it has to use its teeth and masticate its food, while the civilized mother feeds her child cow's milk or milk-soaked food for years after weaning it, although it has an upper and nether millstone spoiling for something to do. Wallace sees grave consequences in this first departure from the order of things established in the precibicultural ages. The heavy mastication necessary for the aboriginal child develops the jaws and the size of the tongue, and, consequently, ample room awaits the permanent teeth as they come, and there can be little doubt that this does away with difficult or pathological dentition. Wallace is convinced that in the rough food, with the fibre and cellulose that accompany it, lies the explanation of the excellent teeth of the savage. As a test experiment, he succeeded in having fourteen children dieted from birth according to his convictions. At ages ranging from five to seven years their teeth were examined, and not one tooth of any one of these children showed the slightest sign of caries. He states further that a similar number of children from the same class with their ordinary diet would have shown not less than eighty or ninety carious teeth at the same age. Wallace makes the modern refinement of food responsible, not only for dental caries, but for the prevalence of dyspepsia, constipation, nasal obstruction and much of the physical degeneracy that follows.

Influences of Saliva Upon Caries.

The same subject, *"The Prevention of Dental Caries and Oral Sepsis,"* is treated in a work by H. P. Pickerill. If there is anyone here who has not read this book, let me commend it to him, especially the chapter on *"Saliva."* While he, also, attaches much importance to food that requires heavy mastication, he finds the

main cause of dental caries in the physical and chemical condition of the saliva, as influenced by the selection and balance of the articles of diet. His book is full of the results of all kinds of laboratory investigation, made with the object of ascertaining the relation between various kinds and combinations of food and an acid mouth favorable to caries, or, on the other hand, an alkaline mouth in which caries is inhibited. These results are all laid out in tabular form, or indicated by curves. In his chapter on the "*Incidence of Caries,*" the tables are most instructive. Among civilized people, where records could be made, the maximum proportion having carious teeth reaches as high as 98 per cent. and over, while in savage races it falls as low as one per cent. In this connection, Pickerill makes one very interesting and important observation. The Maoris, untouched by civilization, are among the very most immune of all races, and yet in examining fifty Maori school children, living under European conditions entirely, he found that 95 per cent. had carious teeth. This fact gives very poor support to the theory that heredity has much to do with immunity or susceptibility to caries.

His chapter on "*Saliva*" abounds in tables giving the results of many ingenious and interesting experiments; tables showing the effect of all kinds of food upon the amount and alkalinity of the saliva during and after eating; the effect on the saliva of various liquids taken with the food; the influence of acid elements in the food; tables showing salivary depressants; results of experiments on the saliva of lower animals; studies on the action and value of ptyalin. Pickerill's conclusions, after setting forth a mass of information, are: That normal saliva, in normal quantity, is a perfect protection for the teeth; that natural organic acids are the stimulants that excite the secretion of the greatest amount of those protective substances, and cause an alkaline flow of saliva for a long time after stimulation. His final statement is very positive. I shall quote it. He says: "That in the saliva is provided a natural and potentially perfect mouth wash, acting continuously day and night; that it is, moreover, completely under control; that it may be altered or varied in amount or composition; that its beneficial effects may be increased or decreased absolutely at will." In another chapter, the results of a series of experiments give the relative fermentibility of the various carbohydrate food-stuffs. Further tables set forth the effect of combining fruit or vegetable acids with carbohydrate food. I shall again quote his conclusions drawn from these experiments. He says:

"Starches and sugars should on no account ever be eaten alone, but in all cases should either be combined with a substance having a distinctly acid taste, or be followed by such substances as have been shown to have an 'alkaline potential,' and the best of these, undoubtedly, are the

natural organic acids found in fruits and vegetables."

Other interesting and valuable chapters follow: *"Dietaries of Immune Races," "Dietaries of Modern Civilization," "Ideal Dietaries," "Educational Measures," "The Need for Special Legislation";* but time and the scope of this paper forbid even a reference to their contents.

Kirk's Views. This brief review of recent work done on the problem of susceptibility to caries would be quite incomplete without a reference to the contributions of Dr. E. C. Kirk. He has for years contended that in addition to the fermentable carbohydrate débris left in the mouth from food, a dissolved carbohydrate, the product of metabolism, finds its way through the circulation into the mouth, and is an important factor in the causation of susceptibility. In an epoch-making paper, read to the Toronto Dental Society last November, Dr. Kirk reiterated his conviction that in addition to the débris which he calls alimentary carbohydrate there is also what he designates as "metabolic" carbohydrate, this dissolved carbohydrate derived from the circulation, and probably due to the overingestion of carbohydrate food. This element is a fertile culture-medium for the lactic-acid-producing micro-organisms. Mouths that are rampant with caries abound with this metabolic carbohydrate, while mouths that are immune have little or none of it. In this paper, Dr. Kirk advanced another theory, which, if well sustained by further investigation, may solve many of the riddles that beset the problem of susceptibility. He drew attention to the well-established fact that an injury to the *hypophysis cerebri* results in a large increase in the carbohydrate content of the blood. Because of the close regional relationship of the *hypophysis cerebri* to the deep origin of the trigeminus, he believes it probable that pathological dentition results in a disturbance of this pituitary body, and may be a factor in the high susceptibility of many individuals. It gives rise to the thought that if Wallace's diet for weaned babies and teething children were carried out, there might not be pathological dentition, and that the enlarged pituitary body, with the accompanying abnormal carbohydrate content of the blood, and its influence on susceptibility, may be traceable to an unnatural and vicious method of feeding infants and children.

I shall not further review recent investigations of the subject of susceptibility and the cause of its prevalence among civilized peoples. There are many other contributions of interest and value, but I have outlined enough for the purposes of my paper.

The bulk of the problem, of course, has yet to be worked out by the investigations of the man of science, but recent research has given us many new conclusions, some possibly correct, others probably correct,

and still others as well established as the limitations of laboratory methods will allow. Surely, an important part of the work lies at the door of the practising dentist. It is he who can try out and check up the conclusions of the laboratory man. If each one of us could experiment on even a few actual cases, and report results to some central bureau, a mass of practical information would accumulate from which many positive and valuable deductions might be made, and many a theory would either become a law or be set aside as untenable. It seems to me that the opportunity for the dentist to do a great service to humanity is very large. In his endeavor to lay his finger on the real cause of caries susceptibility, it seems more than probable that he is also discovering the real cause of many of the ailments and diseases that beset the lives of civilized humanity and make for physical degeneracy.

If this metabolic carbohydrate that is found in the mouth, in the blood stream, in the very tubules of the dentine of carious teeth, is responsible for the rapid proliferation of many varieties of germs found in the mouth, what reason have we for thinking that its influence is confined to the mouth? Is it not probable that while this fertile pabulum is being poured into the mouth it is also being poured into the whole alimentary tract? May it not be responsible for the high bacterial content of the intestines, which Metchnikoff would combat with a buttermilk diet? May it not account for the high degree of infection so frequent in the appendix, and thereby explain the prevalence of appendicitis? And may it not also explain the susceptibility of one individual to typhoid invasion and the immunity of another who is similarly exposed?

The Author's Views on Caries.

Personally, I have done but a fraction of what I might and ought to do along these lines. From the beginning of my experience as a dentist I have been much interested in the enigma of immunity and susceptibility. But although I have possessed neither the time nor the training which would enable me to do any scientific research on the problem, yet, like any practicing dentist, I have had much opportunity for making observations and drawing some conclusions. I have for years inquired into the diet of patients exhibiting the extremes of immunity and susceptibility, and I long ago observed how generally susceptibility went with the excessive ingestion of sugar and sweetened foods. Miller's theory calls for the fermentation of the débris of carbohydrate food about the teeth. Now, the solubility of sugar, its constant dilution in the mouth with saliva, and the rapidity with which it must be swallowed, convinced me that its baneful action on the teeth must be some reaction after deglutition; but I could get no further until Pickerill, Kirk, and others, bridged the gap for me. I learned that over-

ingestion of carbohydrates results in a soluble carbohydrate returning to the mouth by way of the circulation. I learned that this substance is a most fertile culture-medium for micro-organic life. On reading some of Pickerill's tables, I found that my convictions regarding the culpability of sugar in the causation of caries were put to considerable strain, for he shows that cane-sugar is far below chocolate, cake, pastry, and even toast, in the production of lactic acid. I strongly suspect, however, that the mischief done by sugar is as much indirect as direct, but none the less positive. Sugar is so attractive to the average human palate that it, or any food made rich with it, is eaten far beyond the normal promptings of hunger, and thereby the alimentary system is oversupplied with carbohydrate foods of various kinds. Sugar confronts us in so many ways. In candies and chocolate preparations. We dissolve it in our drinks, tea, coffee, cocoa, lemonade, etc. We spread it on our cereals, puddings, pastry, and fruit. We cook it into our cakes, pies, puddings, etc., also in jams, jellies, and marmalade. We find it in syrups and honey. It is indeed difficult at the ordinary table to avoid sugar and sweetened food, even when one wishes to, and, as I said before, it leads to the overconsumption of carbohydrate food. A homely example will point my argument. A hungry individual will eat heartily of meat and vegetables until he can be prevailed upon to take no more, and then he will eat a helping of some sweetened pudding, and perhaps a second helping. If, instead of the sweetened pudding, he had been offered plain boiled rice, he would have eaten none of it, proving that the joke about the little boy's definition of a dessert was no joke at all. He said, you will remember, that "a dessert is what you eat after you have had enough."

My inquiries as to the diet of immunes and highly susceptibles has made very strong my conviction that caries of the teeth is largly a matter of diet. Frequently I have for a time thought I had found cases that contradicted or were exceptions to my usual experience, but further inquiry revealed that some point had been overlooked. An example or two will illustrate.

I have a patient who is immaculate in the care of his teeth and rigid in his diet according to his lights. For years he exhibited less than usual susceptibility. Recently he presented and I found a surprising number of cavities. Upon inquiry there seemed no reason from his diet for the increased susceptibility; but further questions revealed the fact that for some time he had been trying to increase his weight, and to that end he was drinking each night a quart of milk, a large part of which he took in the form of hot cocoa. In view of the fact, set forth in one of Pickerill's tables, that chocolate is more than twenty times as fermentable as cane sugar, it was easy to suspect that his cocoa was

responsible for his remarkable increased susceptibility to dental caries.

Another case was a man of about 48 years. After unusual immunity for years he suddenly exhibited several carious teeth. I probed for sugar in his diet. He confidently told me I should have "to guess again," as he was not fond of sugar and left the candies to the ladies. I made a detailed inquiry, running over a list of possible sources, naming jams, jellies, marmalade, honey, syrup, etc. At the mention of honey, his wife, who was standing by, exclaimed, "Why, George just lives on honey!" It transpired that some two years previously he had discovered something special in the honey line, and was assured that it was most wholesome as a food.

In some cases I have had the patient for one week keep a detailed record of everything eaten or drunk, and some amazing menus have been revealed by this method which never would have come out through the ordinary inquiry. I have to thank Dr. Kirk for suggesting this way of getting at facts.

I shall refrain from a further recital of cases, as they are usually very tedious, but I might tell of several children with marked susceptibility, where I was able to gain the co-operation of both child and parent in the observation of a more correct diet. After the first year these cases have been practically immune, and, with it all, a noticeable improvement in general health.

I have found some difficulty in the matter of instructing patients about a diet. One may tell them to choose the rougher, more fibrous foods, that will demand mastication; to cut down their consumption of sugar and sweetened foods; to eat succulent vegetables and fruits, etc. But these are generalities, and many patients do not seem to be able to follow them intelligently. It has taught me the need of having a more specific or detailed diet to recommend. To this end, would it not be possible and practical to have a few committees in various centres, composed of, say, a dentist posted on the essentials of diet for the well-being of the teeth and mouth; a physician, with special fitness as an alimentary specialist, and the head of a domestic science school, and have these committees work out a week's menu, physiologically correct, and at the same time presenting an agreeable and appetizing variety. Along with this physiological bill of fare might be appended, or paralleled, a list of those foods or combinations that should be avoided. I am well aware that a menu suitable for one would not be best for all. Age, occupation, climate, and other things, would call for modifications of a general diet. But the vital principles that are essential for one woud probably be the same for all, except perhaps in some pathological cases.

We are all familiar with the work done by the dentists in the public

schools of Cleveland and other centres, to arouse public interest in the national importance of having the rising generation grow up without the handicap that goes with decaying teeth and foul mouths. It has been abundantly proved that much of the physical degeneracy about us, and with it mental and moral degeneracy, are traceable to dental caries and septic mouths. If the dentist did no more for the public weal than the carrying out of this work, the results should entitle him to a place among the noble professions; but I am convinced that a far greater opportunity for service is knocking at his door. I am satisfied that our scientific investigators are establishing a positive relationship between a faulty selection and balance of diet and dental caries. I am hopeful that, with the organized co-operation of the practicing dentist, it will soon be possible to put practical immunity to caries within the reach of all; and in wiping out the cause of dental caries there is little doubt that with it will disappear many of the maladies that afflict civilized humanity and make for degeneracy.

Sir William Osler said recently that the next great thing in the matter of public health is coming from the dentist. Is the professional spirit of the dentist and his interest in the welfare of mankind large enough to find him enlisted in the work that will fulfill the prophesy of this great physician?

Dental Hygienists at Work in the Public Schools of Bridgeport.

In the editorial in the January issue, in an endeavor to estimate the amount of dental work which could confront the Forsyth Dental Infirmary, we started with the premise that there are 122,000 school children, eighty per cent. of whom show dental defects, making a total of 97,600. We have discovered that our figures were erroneous. The editor of the *Dental Cosmos,* in his January issue, dealing with the same subject, tells us that there are 118,000 children in the public schools of Boston, so that of course there can not be 122,000 defective children. In his address at the dedicatory exercises, Mr. Edward T. McSweeny stated that there are 128,000 children in the Boston schools, and then alluded to "122,459 defects noted." The writer evidently misapprehended this statement and supposed that Mr. McSweeny meant that there are that number of defective children, whereas he evidently meant merely that number of separate defects. A communication was sent to Dr. Wm. J. Gallivan, Chief of Bureau of Child Hygiene, Boston, asking for correct statistics, and his reply reads as follows: "Total attendance public school, one hundred and ten thousand; attendance first grade, fifteen thousand."

These figures appear to be lower than those given by Mr. McSweeny or by Dr. Kirk, and without further consideration would seem to render our final estimate of work needed (1,000 cavities per day) as greatly

exaggerated; yet in the light of other information received since the editorial was written, the guess appears not to have been far wrong.

We argued that eighty per cent. of the 122,000 children (Mr. McSweeny's figures), or 97,600, would have four cavities each (as estimated by Dr. Ward Crampton), a total of 390,400 cavities.

Estimates as to how many cavities might be found in a school, in the past has been largely arrived at upon a basis of averages, dependent upon the examination of the mouths of a few hundred children. In this issue appears a paper by Dr. A. C. Fones, this being the first report of the work of Dental Hygienists in Public Schools, and by examining and actually counting the cavities in the mouths of 4,666 children, he finds *an average of six cavities per child, not of eighty per cent. of them, but of all of them.* Therefore, if the same ratio would hold good in Boston, the 110,000 children there (Dr. Gallivan's figures) would have 660,000 cavities instead of the 390,000 which was the basis of our January argument. The writer, however, does not claim, nor does he think that this percentage would hold for the entire school population, but he does believe that if an actual count could be made, the January figures would not be very far wrong. However, we have another and a serious side of this question to discuss, and it is of especial interest, because it has not been discussed heretofore.

The Proposed Solution of the School Problem.

The solution of the school problem as outlined last month was that trained dental nurses, or dental hygienists if the term is preferred, should take charge of the children in the first grade, and follow these same children into the second, third, fourth and fifth grades, a new supply of nurses each year taking first grade children. By this means it was suggested that caries of the permanent teeth would be detected early, and being in the incipient stage always, the Forsyth Dental Infirmary might be able to treat and fill them as fast as found. The writer overlooked what now seems to be a problem of the first magnitude, viz: *caries already existing when the child enters school.*

Dr. Fones advocates practically the same plan (indeed, the writer very probably borrowed the idea from Dr. Fones), but he reports the new fact of importance which the practical application of his plan has so promptly brought to light.

The city of Bridgeport having entrusted to Dr. Fones the testing of his preventive or prophylactic clinic, he and his assistants trained ten women to be dental hygienists and put these women to work in the public schools. In children of the first grade they treated 3,826 children and discovered 21,432 cavities in the temporary teeth, and 1,575 cavities in permanent teeth. They also treated 840 children in the second grade, finding 4,092 cavities in temporary teeth and 742 cavities in permanent teeth, a total of 25,524 cavities in temporary, and 2,317 in permanent teeth.

A curative clinic might be inaugurated to care for the cavities in the permanent teeth, if Bridgeport had a Forsyth, but the 25,524 cavities existing in the temporary teeth before the hygienist could give even one prophylactic treatment, confronts us with a problem which must be met. We are in debt to Dr. Fones and his co-workers, however, for showing us this problem, because we could not find a solution while in ignorance of the facts.

It is still the belief of Dr. Fones, of the writer and of others, that the prophylactic clinic in the hands of properly trained women, working in conjunction with an adequate curative clinic, can practically eradicate caries from the permanent teeth. But this tremendous extent of caries in temporary teeth, of course, cannot be controlled by dental nurses, nor by nurses and dentists jointly, if nothing is done before the child enters the first grade. The task is too tremendous.

It must be remembered that Dr. Baker, of Boston, has proved with young rabbits that the non-use of the teeth during the infancy of the animal retarded the development of the jaws and even of the brain cavity itself. Dr. Baker's experiments were repeated by a German investigator with like results. It is manifest, therefore, that caries of the temporary teeth, by interfering with proper mastication and by hindering proper use of the jaws, must be a factor in the lack of development of children so suffering. Add to this the infectious material poured into the system from abscesses upon these temporary teeth, and we have another element of retardation through corruption.

The time must come then when this temporary tooth problem must be met. If the dental nurses in the Bridgeport experiment prove their efficiency and fulfill but half of Dr. Fones's prophesy, they will quickly

be recognized as a public necessity in all progressive municipalities. Then very probably it will be found expedient to introduce the nurse into the kindergartens.

There are two other possibilities. What is done in school is reported at home. If we can but arouse communities to the point of providing dental nurses for the compulsory cleansing of the teeth of school children, the parents mayhap will be sufficiently interested to provide them with tooth brushes prior to their entrance into school in the first grade classes.

The other hope is that the child taught mouth hygiene in school will go back to the home and teach it to his little brothers and sisters, yea, even unto the mothers and fathers.

Already Dr. Fones tells us of two significant occurrences. One youngster was caught stealing a box of tooth brushes that he might supply his home folks. Some progress has been made when a child will count a tooth brush as worth stealing. In another instance a lad of eight was seen surrounded by nine or ten grown men. Investigation disclosed that he had received his first lesson in tooth-brushing, and brush in hand was spreading the gospel of the clean mouth among his elders, and giving a practical demonstration of the Fones mouth cleansing methods. Verily a prophylactic missionary, aged eight!

All who are interested in the mouth hygiene movement should watch the results of the Bridgeport experiment, for by it we shall undoubtedly learn the true method of curbing the evil of dental caries and the worse evil of mouth and systemic infection which follows in its wake.

The Trained Dental Nurse.

While on the subject of the dental nurse, or dental hygienist, a word may be said to those that oppose the movement. The advocates of the nurse have been grossly misunderstood in two important respects. First, by a trained dental hygienist we do not mean office girls trained by private practitioners. We would not ask any State Legislature to legalize such workers, any more than we would expect licenses to be granted to dentists taught by other dentists, though in times past that was the only method of entrance into dentistry. So likewise in the past the greater number of non-graduate women practicing prophylactic cleanings have been trained by individuals. But the hygienist

of the future, the woman to whose tender and skilled care we stand ready to intrust the great work of saving our children, must, of course, be a graduate of a proper training school.

Again we are in debt to Dr. Fones, not alone for carrying through the first course of this kind, but for producing along with this band of graduates a text book for the training of others, which work is even now in press.

A Possible Work for the Forsyth Infirmary.

Let us for just a moment apply the figures given to us by Dr. Fones to the Boston situation, to get some adequate idea of just what the task is in the first grade alone. Dr. Gallivan tells us there are 15,000 first grade children in Boston. In Bridgeport there are 3,800. Let us say that the Boston first grade contains approximately four times as many children as Bridgeport. Then, if the ratio of defects should prove to be the same, in Boston we would find 85,728 cavities in temporary teeth and 6,300 cavities in permanent teeth in children in the first grade. In regard to the latter, the infirmary certainly should be able to care for all, though, if the first permanent molar problem is solved without resort to forceps, as it should be, and if all roots that need filling be properly filled, a radiograph of the result being filed with the record as proof of the operator's success, the infirmary might find little time left for other school grades.

In regard to the temporary teeth, it would be necessary to decide whether extraction, with the possible inducement of malocclusion, or the retention of infected teeth where time is lacking for their salvation, would best serve the interests of the child.

Perhaps if the infirmary devoted all its time to the first grade alone, it might save all teeth that are savable. Experience alone will tell.

Number of Nurses Needed in Boston.

Last month we suggested that the Forsyth Infirmary might have a training school for dental nurses, educating and using from fifty to sixty women. Now we find that in Bridgeport Dr. Fones has cared for all the first grade children and over 800 of the second grade with a corps of eight hygienists, which number has recently been increased to ten. When we remember that these women carry their equipment about with them, the equipment consisting of a fold-

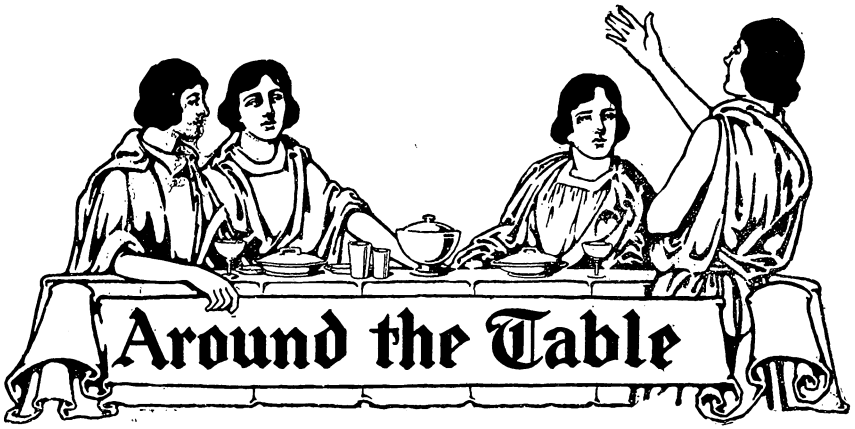
ing dental chair, a cabinet and a dental engine, and that they must work in any odd unoccupied corner, and then picture the elaborate outfit in the Forsyth Infirmary, we can but believe that thirty or forty nurses in that institution could easily accomplish all that the Bridgeport women are doing, the Boston first grade being just about four times as large as that in Bridgeport.

Saving the Permanent Teeth.

But let us for a moment return to a consideration of the caries of the permanent teeth. In 3,826 children in the first grade in Bridgeport the hygienists found 1,575 cavities in permanent teeth, that is to say about forty per cent. of the children had one cavity each in permanent teeth.

It is fair to presume that the children now in the second grade would have exhibited about the same ratio of caries had they been examined while in the first grade. In the mouths of 840 of these second grade children the hygienists found 742 cavities in permanent teeth. Thus in the second grade the percentage is almost ninety per cent. having one carious permanent tooth, an increase from forty per cent. to ninety per cent. in one year.

In the Bridgeport experiment, without the aid of a curative clinic where the existing cavities in the permanent teeth of the first grade children could be filled, suppose that a year from date it could be shown that the second grade children, after one year of prophylactic training and care by the Fones corps of dental hygienists, would have but fifty or sixty per cent. with caries in permanent teeth, would not the dental hygienist have proven her efficiency?



WE SAY WE WILL NOT, and then we do! Did you ever notice that? Better not make promises even to yourself, because you never can tell! Haven't I promised myself, more than once not to talk business methods in *Items of Interest*, and wasn't I beguiled into doing so in the October number, just because some men wrote me clever letters! And even as I did it, did I not speak of "my reluctance to launch this magazine into any campaign of business talks?" And then in order to reply to my Kentucky friend, I was forced to resume the talk in November, and that was where I mired in up to the knees, and now I am compelled to dig myself out, as it were. But let me explain.

H H H

THE HOTEL ORMONDE is in Brooklyn, Borough of Brooklyn, City of New York, State of New York. The invitations to the last meeting of the Second District Dental Society mentioned that there would be a dinner first, at the Ormonde, and then further stated that the Ormonde is "on Fulton Street, between Bedford and Nostrand Avenues." The traveller from New York (the original little old New York, which is on Manhattan Island) goes part way by subway and under-the-river tube, and thence by trolley. In this manner he arrives at Bedford Avenue first, and as the trolleys in Brooklyn stop but once in each block, even though a Brooklyn block is the same as a half-mile or so in any other city, I ask any kind friend would he not have debouched, as it were, from the trolley at Bedford Avenue, walking thence in the general direction of Nostrand Avenue, with eyes upon the house signs and numbers, searching for the Hotel Ormonde?

H H H

WELL KIND FRIEND that is where you would have made a mistake. Now I am not denying that the Hotel Ormonde is between Bedford and Nostrand Avenues, but I would like to just mention that after arriving at the Ormonde entrance, if you walk ten feet further, you will be at Nostrand Avenue.

HOWEVER, I AM COMPELLED to admit that this fact did not trouble me, because I went over in a $3,000 automobile belonging to one of my friends and came back in a $6,000 limousine belonging to another. There was some right friendly chat in that limousine, too, but as there were three dental hygienists in the party, it was all confidential. But what happened at the Ormonde was different, especially as it happened mainly to me.

⌘ ⌘ ⌘

I WAS REALLY HAVING a mild but merry little time at a table where half of the diners were of the fair sex, when I heard the following words at a nearby table. "The point is this: ITEMS OF INTEREST has so much influence in this Society that I am sorry to see the editor recommending what I consider unethical methods to young men just starting in." Naturally after that I lost my appetite for the caviar, and had to go over and ask when I did it.

⌘ ⌘ ⌘

THE CHIEF SPEAKER was our delegate to the Executive Council of the State Society, so I will just call him the Councilman. I asked the Councilman to explain, and he certainly did explain. He spoke somewhat as follows:

⌘ ⌘ ⌘

"IN YOUR TABLE TALK for November," said he, "I take exception to one piece of advice. You recommend that young men starting in dental practice should set a high price upon their services, and then when working for less, to tell the patient that she must consider herself in debt until she can send him patients who will pay as much as he has reduced his charges. In my opinion there is no difference between that method and offering commissions to patients to act as agents. In fact it is an advertising scheme, pure and simple, and is little if any better than throwing handbills away in the street. I am perfectly frank you see, and tell you openly you should never have printed that sort of stuff. There, I have said my say, now what is your answer?"

⌘ ⌘ ⌘

"I MIGHT TELL you a story," said I. "This is the story. Mrs. Flannigan called on Mrs. Maloney, and Mr. Maloney was at home and busy writing. 'What are ye writin', Mike?' said Mrs. Flannigan. 'Faith,' said Maloney, 'I'm writin' down a list of all the min in this ward that I can lick.' 'And by any chance,' said Mrs. Flannigan, 'does the name of Patrick Flannigan decorate the list that ye are inscribing?' 'It do,' said Maloney. 'Indade I find that name at the very top of the list.' Mrs. Flannigan returned to her home, and reported the interesting facts to her spouse, who without words of comment got into his street jacket, took down his blackthorne stick and leisurely strolled around to the house of his friend, Maloney. Upon arriving, and having exchanged greetings, he casually remarked: 'Maloney, it has been reported to me by wan whom I trust that ye have made a list of min ye can lick, and that my name is therein mentioned?' 'Ye have it right,' said Maloney. 'I may have it right,' said Flannigan, "but ye have it wrong. Ye can't lick me, and if ye doubt me word, come outside and we'll settle the dispute

❖ as between min.' 'Oh, well!' said Maloney, 'if ye feel that way about it,
❖ I'll just scratch your name off me list.'"

⌘ ⌘ ⌘

THE MEN AT TABLE all laughed, but really it is no laughing matter.
❖ The trouble with putting anything into print is that it remains in print
❖ a long time. The facts are as follows. My Kentucky correspondent,
❖ whose letter was quoted in part, in the October issue, when asking for
❖ a discussion of methods of beginning practice available by young men.
❖ did not ask for my own personal experiences. Indeed in the actual
❖ letter he suggested, by name, one or two men whose opinions might be
❖ helpful. It happened that when writing what was published, I recalled
❖ that a certain dentist of international reputation, once in my hearing was
❖ discussing this whole question and outlined the plan, which I undertook
❖ to give.

⌘ ⌘ ⌘

UNFORTUNATELY IT DID NOT occur to me that any such construction
❖ might be put upon it, as evidently has been, or most assuredly it never
❖ would have appeared in these pages. The Councilman, however, was not
❖ the first to criticize. I received a letter from a young graduate asking
❖ what was the difference between the plan recommended, and the man
❖ who sends his friends to a certain furniture store, and then goes around
❖ and collects a commission. There really is no similarity whatever, but
❖ it is very evident that I have unintentionally given out an impression
❖ which was far indeed from my thoughts. And as I study over the lan-
❖ guage used I conclude that I expressed myself very badly. Can one say
❖ more?

⌘ ⌘ ⌘

BUT MORE MUST BE SAID. It is rather annoying to be called upon to
❖ defend a proposition which really was not my own, and which never in
❖ the slightest degree has been practiced by myself. However, as the In-
❖ ternational Person who suggested the scheme within my hearing is him-
❖ self a perfectly ethical dentist, I feel that, anonymously, I have misrep-
❖ resented him. So now let me try to explain the plan as perhaps it was
❖ really meant.

⌘ ⌘ ⌘

AT THE OUTSET it was recommended that early in his career the young
❖ dentist should fix a fair fee for his services. It was shown how difficult
❖ it is to increase one's fees for patients for whom one has worked for
❖ several years. No one I think will see anything unrighteous in this
❖ course. Next we come to the visit of a person who cannot afford to pay
❖ the sum which you think is a fair and proper fee for the service needed.
❖ Three courses are open to you. You may say: "I am sorry, but I never
❖ reduce my charges." Would that be entirely ethical? Secondly, you may
❖ say: "Very well, Madam, tell me what you can afford and I will do your
❖ work." That would be perfectly ethical, of course, but would it be wise
❖ or business-like? What is the third course? It is the plan which I tried
❖ to explain, and which I evidently described very badly.

⌘ ⌘ ⌘

RIGHTLY OR WRONGLY we all feel that, entirely regardless of the actual
❖ payment of our charges, our patrons owe us something. Because of our

notions of ethics we debar ourselves from the advertising methods by which the commercial man attracts business. How then are we to get business? If when a patient pays a fee he feels that he has entirely cancelled his obligation, then, of course, he does not go among his friends acting as our "agent," to quote the word of the Councilman. But having abandoned the advantages of advertising methods, is it not true that we do expect our patients to go about advising their friends to come to us? How do we bring this about? Usually by doing for the patient something more than the bare service for which he pays. You may fill a tooth, make a charge, collect, and dismiss the patient. In that case you are charging and receiving pay for all that you do. Again you may fill the tooth, extending great sympathy for any pain inflicted, hoping it will not occur again, using a gentler touch next time, pausing at every evidence of distress, patiently stopping work at the patient's request, and thus and in a hundred other ways doing those little things that cannot be entered nor itemized in a ledger, but which creates an obligation on the side of the patient, an obligation which he cancels by recommending his friends.

THUS WE DO HOPE that our patients will act as our agents among their friends, and we feel entitled to this because we have given more than we have charged for. Very well. Thus far we are entirely ethical. Now the plan the International Person advocated was that to avoid getting the reputation of working for low prices, the young man, might fix a proper fee at the outset, and get it as often as possible. Then if he accepts a smaller fee, this Person advised that he should let the patient understand that the lowering of the fee creates an obligation which may be met not in money, but in recommending his friends.

THERE CERTAINLY is no analogy between this and paying a man a commission for sending customers to a furniture shop. In the former case the "agent," if you must call him so, works in gratitude for a service rendered at a cost less than its full value. In the latter the "agent" is working entirely for financial profit for himself. The plan I am sure was not conceived in any unethical spirit, yet under a very strict ruling it may be unethical. I do not know, never having tried it.

WE ALL EXPECT our patients to recommend their friends, but perhaps we should not ask them to do so. I certainly never have. And so, of course, if we take half a fee, perhaps we should not intimate to the patient that he is under an obligation. Probably he would know it without being told. Therefore I regret having published the plan.

ONCE MORE I PROMISE myself to keep business talks out of this magazine.

National Society Meetings.

PANAMA-PACIFIC DENTAL CONGRESS, San Francisco, Cal., August 30 to September 9, 1915.
Secretary, Dr. Arthur M. Flood, 240 Stockton St., San Francisco, Cal.

State Society Meetings.

ALABAMA DENTAL ASSOCIATION, Montgomery, Ala., April 13, 1915.
Secretary, Dr. J. A. Blue, Birmingham, Ala.

ARIZONA STATE DENTAL SOCIETY, date and place will be announced later.
Secretary, Dr. J. L. O'Connell, Phoenix, Arizona.

ARKANSAS STATE DENTAL ASSOCIATION, Little Rock, Ark., May 13-15, 1915.
Secretary, Dr. W. B. Dormon, Nashville, Ark.

COLORADO STATE DENTAL ASSOCIATION, June 17, 18, 19, 1915.
Secretary, Dr. Earl W. Spencer, 119-120 Pope Block, Pueblo, Colo.

CONNECTICUT STATE DENTAL ASSOCIATION, Hartford, Conn., April 20-22, 1915.
Secretary, Dr. E. R. Bryant, New Haven, Conn.

FLORIDA STATE DENTAL SOCIETY, date and place will be announced later.
Secretary, Dr. Alice P. Butler, Gainesville, Fla.

ILLINOIS STATE DENTAL SOCIETY, Peoria, Ill., May 11-14, 1915.
Secretary, Dr. Henry L. Whipple, Quincy, Ill.

INDIANA STATE DENTAL ASSOCIATION, Indianapolis, Ind., May 18-20, 1915.
Secretary, Dr. A. R. Ross, Lafayette, Ind.

IOWA STATE DENTAL SOCIETY, Waterloo, Ia., May 4-6, 1915.
Secretary, Dr. C. M. Kennedy, Des Moines, Iowa.

KENTUCKY STATE DENTAL ASSOCIATION, Ashland, Ky., June 8-10, 1915.
Secretary, Dr. Chas. R. Shacklette, The Atherton Bldg., Louisville, Ky.

MARYLAND STATE DENTAL ASSOCIATION, Baltimore, Md., June 11-12, 1915.
Secretary, Dr. F. F. Drew, 701 N. Howard St., Baltimore, Md.

MASSACHUSETTS DENTAL SOCIETY, Boston, Mass., May 5-7, 1915.
Secretary, Dr. A. H. St. C. Chase, Everett, Mass.

MINNESOTA STATE DENTAL ASSOCIATION, date and place will be announced later.
Secretary, Dr. Max E. Ernst, 614 Lowry Bldg., St. Paul, Minn.

MISSISSIPPI DENTAL ASSOCIATION, Jackson, Miss., April 20-22, 1915.
Secretary, Dr. M. B. Varnado, Osyka, Miss.

MISSOURI STATE DENTAL ASSOCIATION, Golden Jubilee Meeting, Jefferson City, June 10-12, 1915.
Secretary, Dr. S. C. A. Pubey, New York Life Bldg., Kansas City, Mo.

MONTANA STATE DENTAL SOCIETY, date and place will be announced later.
Secretary, Dr. F. W. Adams, Chicago Block, Billings, Montana.

NEW HAMPSHIRE STATE DENTAL SOCIETY, date and place will be announced later.
Secretary, Dr. Louis I. Moulton, 15 No. Main St., Concord, N. H.

NEW JERSEY STATE DENTAL SOCIETY, Asbury Park, July 21-24, 1915.
Secretary, Dr. John C. Forsyth, 430 E. State St., Trenton, N. J.

NEW MEXICO STATE DENTAL SOCIETY, Albuquerque, N. M., date will be announced later.
Secretary, Dr. J. J. Clarke, Artesia, N. M.

NEW YORK STATE DENTAL SOCIETY, Albany, N. Y., May 13-15, 1915.
Secretary, Dr. A. P. Burkhart, 52 Genesee St., Auburn N. Y.

NORTH CAROLINA DENTAL SOCIETY, Wrightsville Beach, N. C., June 23-25, 1915.
Secretary, Dr. R. M. Squires, Wake Forest, N. C.

OHIO STATE DENTAL SOCIETY, Columbus, Ohio, December 7-9, 1915.
Secretary, Dr. F. R. Chapman, 305 Schultz Bldg., Columbus, Ohio.

OKLAHOMA STATE DENTAL SOCIETY, Oklahoma City, Oklahoma, March 15-19, 1915.
Secretary, Dr. C. R. Lawrence, Enid, Oklahoma.

PENNSYLVANIA STATE DENTAL SOCIETY, Reading, Pa., June 22-24, 1915.
Secretary, Dr. L. M. Weaver, Philadelphia, Pa.

SOUTH CAROLINA STATE DENTAL ASSOCIATION, Columbia, S. C., April 13-16, 1915.
Secretary, Dr. Ernest C. Dye, Greenville, S. C.

TENNESSEE STATE DENTAL ASSOCIATION, Sewanee, Tenn., June 24-26, 1915.
Secretary, Dr. C. Osborn Rhea, 625½ Church St., Nashville, Tenn.

TEXAS STATE DENTAL ASSOCIATION, Galveston, Texas, May 19-22, 1915.
Secretary, Dr. W. C. Talbot, Fort Worth, Texas.

UTAH STATE DENTAL SOCIETY will meet in San Francisco, Cal., during the Panama-Pacific Dental Congress in August, 1915.
Secretary, Dr. E. C. Fairweather, Boston Bldg., Salt Lake City, Utah.

VERMONT STATE DENTAL SOCIETY, May 19-21, 1915.
Secretary, Dr. P. M. Williams, Rutland, Vt.

VIRGINIA STATE DENTAL ASSOCIATION, Richmond, Va., Nov. 4-6, 1915.
Secretary, Dr. C. B. Gifford, Norfolk, Va.

W. VIRGINIA STATE DENTAL SOCIETY, Wheeling, W. Va., April 14-16, 1915.
Secretary, Dr. J. W. Parsons, Huntington, W. Va.

WISCONSIN STATE DENTAL SOCIETY, Oconomowoc, Wis., July 13-15, 1915.
Secretary, Dr. O. G. Krause, 1209 Wells Bldg., Milwaukee, Wis.

Rules Governing Clinicians and Essayists of the Panama-Pacific Dental Congress.

RULE VI.

"Papers may be read and discussed before the Congress in any language, but copies of all papers, or summaries of papers and discussions, typewritten in the English language, ready for printing, must reach the Program Committee in San Francisco, not later than May 1, 1915."

RULE VII.

"Each paper and discussion will be printed in full in the published transactions of the Congress, but a maximum of twenty minutes only will be allowed for the reading of a paper, or a summary of it, embracing its leading points, in case the reading of the original would occupy more

than the allotted time, and five minutes for each speaker taking part in the discussion; not more than fifteen minutes will be allowed for the discussion of any paper, and the author will be allowed five minutes in closing the discussion.

"The author of each paper is requested to furnish the Secretary of the Section to which his paper belongs with the names and addresses of those who will discuss his paper."

RULE VIII.

"No clinic will be given a place on the program of the Congress unless a concise description of it, typewritten in the English language, ready for printing, reaches the Clinic Committee in San Francisco, on or before May 1, 1915."

The Panama Pacific Dental Congress is to be held at San Francisco, August 30th-September 9th, 1915.

The Transportation Committee are recommending the following plan and schedule of railway rates from New York, Chicago and other points of the East to San Francisco and return.

Following the usual custom and in order that all those who desire to attend the Panama-Pacific Dental Congress at San Francisco, August 30th to September 9, 1915, may do so with the maximum of comfort and pleasure and minimum of fatigue and inconvenience, the Transportation Committees announce that arrangements have been made for special train service. The present plan is to have three special trains from Chicago leaving as follows:

First train, leaves Chicago on August 21st, going via Kansas City and the Santa Fe. Stop-overs will be made at Colorado Springs, Isleta Indian Village, the Grand Canyon, Redlands, Riverside, San Diego and Los Angeles.

Second train, leave Chicago on August 24th, going via Denver D. & R. G. and Western Pacific. Train two includes stop-overs of one day in Colorado Springs and special attention has been given to the schedule so that our party will pass through the scenic points of interest in daylight.

Third train, leave Chicago on August 25th, going via Denver, the D. & R. G. and Western Pacific as in route two. It will be noted that the two trains, that is, the trains leaving Chicago on the 24th and 25th, will meet in Colorado Springs and proceed from there in one or two trains according to the number who will take this route. It will also be noted that all the trains have been arranged so as to arrive in San Francisco one day prior to the opening of our convention.

There is a possibility that the number from the East will be sufficiently large to warrant the running of a special train right through from New York, in which case the Eastern and Chicago, and in vicinity parties, will be consolidated and go as one train from Chicago. In the events that there is not a sufficient number to warrant the running of a special train from New York, special through sleepers will be provided and will run through from New York to San Francisco on all of the three schedules outlined.

For the advance information of those interested in the trip the Transportation Committees have endeavored to show briefly what the schedules of the trains will be. A circular outlining the trip in detail will be prepared sometime in the near future and will be distributed generally to members of the association.

TRAIN SCHEDULE I.

Lv. Boston	2:00 P.M.	Aug. 20th		Via Boston and Albany
Lv. New York	5:00 P.M.	"	"	Via N. Y. Central Wolverine
Ar. Albany	8:15 P.M.	"	"	"
(Connect with trains from Boston and other points in New England States.)				
Ar. Schenectady	8:47 P.M.	Aug. 20th		Via N. Y. Central Wolverine
Ar. Utica	10:23 P.M.	"	"	"
Ar. Syracuse	11:40 P.M.	"	"	"
Ar. Rochester	1:20 A.M.	"	21st	"
Ar. Buffalo	3:10 A.M.	"	"	"
Ar. Detroit	7:10 A.M. (eastern time)	"	"	"
Ar. Chicago	2:00 P.M. (central time) (central station)			

Those desiring a less expensive train to Chicago can leave Grand Central Terminal 2:00 P.M., August 20th, due Chicago 5:00 P.M., August 21st. No extra fare is charged on this train.

Lv. Chicago	6:10 P.M.	Aug.	21st	Via Chic. Burlington & Quincy
Ar. Kansas City	8:00 A.M.	"	22nd	
Lv. Kansas City	11:00 A.M.	"	"	Via Atchinson, Topeka, and
Ar. Colorado Springs	6:30 A.M.	"	23rd	Santa Fe
Lv. Colorado Springs	8:30 P.M.	"	"	
Ar. Albuquerque	1:20 P.M.	"	24th	
Lv. Albuquerque	2:00 P.M.	"	"	
Ar. Isleta	2:30 P.M.	"	"	
Lv. Isleta	4:00 P.M.	"	"	
Ar. Grand Canyon	5:00 A.M.	"	25th	
Lv. Grand Canyon	8:00 P.M.	"	"	
Ar. Redlands	12:30 P.M.	"	26th	

Lv. Redlands	2:30 P.M.	"	"	
Ar. Riverside	3:30 P.M.	"	"	
Lv. Riverside	11:59 P.M.	"	"	
Ar. San Diego	7:00 A.M.	"	27th	
Lv. San Diego	11:59 P.M.	"	"	
Ar. Los Angeles	7:00 A.M.	"	28th	
Lv. Los Angeles	8:00 P.M.	"	"	Via Southern Pacific
Ar. San Francisco	9:45 A.M.	"	29th	

Railway fare from New York to San Francisco via the above route and returning via any direct route (plus $7.50 for Canyon) $98.80
The Wolverine--Fast Express New York to Chicago--extra charge 6.00

Railway fare from Chicago to San Francisco going via the above route and returning via any direct route..... $62.50
Lower berth from New York to Chicago..... 5.00
Lower berth, Chicago to San Diego (estimated)..... 18.50
Lower berth, San Diego to Los Angeles..... 1.50
Lower berth, Los Angeles to San Francisco..... 2.50
Side trip from Williams to Grand Canyon and return..... 7.50

There are many passenger trains from New York to Chicago. The faster trains are more expensive. The fare on the slower trains is less. Either can be utilized in making connection with the following schedule:

TRAIN SCHEDULE II.

Lv. Chicago	11:00 P.M.	Aug.	24th	Via C. B. & Q.
Ar. Denver	7:00 A.M.	"	26th	
Lv. Denver	8:00 A.M.	"	"	Via D. & R. G.
Ar. Colorado Springs	10:30 A.M.	"	"	
Lv. Colorado Springs	10:30 A.M.	"	27th	
Ar. Salt Lake City	12:30 P.M.	"	28th	
Lv. Salt Lake City	1:00 P.M.	"	"	Via Western Pacific
Ar. San Francisco	5:00 P.M.	"	29th	

Railroad fare from Chicago to San Francisco going via the above route and returning via any direct route..... $62.50
Returning via Portland, Oregon..... 80.00
Lower berth, Chicago to San Francisco (estimated)..... 15.00

TRAIN SCHEDULE III.

Lv. Chicago ..... 11:00 P.M.	Aug. 25th	Via C. B. & Q.
Ar. Denver ..... 7:00 A.M.	" 27th	
Lv. Denver..... 8:00 A.M.	" "	Via D. & R. G.
Lv. Colorado Springs ..... 10:30 A.M.	" "	
Ar. Salt Lake City.....12:30 P.M.	" 28th	
Lv. Salt Lake City..... 1:00 P.M.	" "	Via Western Pacific
Ar. San Francisco ..... 5:00 P.M.	" 29th	

Rates will be the same as route II except that a standard lower berth from Chicago to San Francisco will be..... $13.00
By the Northern Routes to San Francisco and return by a central or southern route, there is an added fee of..... 17.50

Applications for space should be addressed to Mr. C. E. Colony, City Ticket Agent, B. & A. Road, Boston, Mass., or Mr. W. V. Lifsey, General Eastern Passenger Agent, New York Central Lines, 1216 Broadway, New York City.

TRANSPORTATION COMMITTEE NATIONAL DENTAL ASSOCIATION.

DR. VICTOR H. JACKSON (Chairman), New York.
DR. H. F. HOFFMAN, Denver, Colo.
DR. JOS. D. EBY, Atlanta, Ga.
DR. D. C. BACON, Chicago, Ill
DR. HENRY W. WEIRICK, San Francisco, Cal.
DR. J. P. MARSHALL, St. Louis, Mo.

TRANSPORTATION COMMITTEE PANAMA PACIFIC DENTAL CONGRESS.

DR. HENRY W. WEIRICK (Chairman), San Francisco.
DR. HARRY P. EVANS, N. Y.
DR. ALPHEUS R. BROWN, Boston, Mass.
DR. E. M. CARSON, St. Louis, Mo.
DR. F. W. GETHRO, Chicago, Ill.
DR. JOS. D. EBY, Atlanta, Ga.

Free Course of Instruction Given by College of Dentistry University of Illinois.

Beginning Monday evening, February 8th, and continuing every Monday evening through February and March. The course will be given in the Amphitheatre of the College Building, 1838 W. Harrison St., corner Honore, beginning promptly at 8 o'clock each evening and

lasting one hour. The course is open without cost to ethical practitioners of dentistry and medicine.

I. Local Anesthesis.

1. General principles governing local anesthesia.
2. Infiltration and conductive anesthesia.
3. Choice of drug.
4. Novocain; its toxicity, irritability, etc.
5. Preparation of solution.
6. Selection of syringe and needles.
7. Technique of injections, illustrated by stereopticon and actual demonstrations on patients. These demonstrations will include the application of novocain in major and minor oral surgery, extraction of teeth, pulp removal, cavity preparation, etc.

Frederick B. Moorehead.

II. Nitrous Oxide and Oxygen.

Anesthesia and analgesia.

A discussion covering the use of nitrous oxide and oxygen for anesthesia and analgesia purposes with demonstrations illustrating technique, selection of outfit, etc. Application of these agents in cavity preparation, and pulp removal illustrated on patients.

Louis Schultz.

III. Enamel Cleavage.

Illustrated by stereopticon.

1. Structural elements of enamel; their arrangement and character of the tissue.
2. Effect of caries on the structure of the enamel.
3. Cleavage of enamel; the relation of the cutting instruments to the structural elements of the tissue in cutting enamel.
4. The arrangement of the structural elements in a strong enamel wall.
5. The preparation of typical cavity walls.

Frederick B. Noyes.

IV. The Mouth as a Factor in Pathogenesis.

1. Irritation.
   Difficult to measure harm of irritants.
   The delinquent boy and girl.
   Impacted and unerrupted teeth, irregular teeth, contracted arch, adenoids, faulty breathing, etc.
   Tartar, gingivitis, endarteritis, etc.
   Ulceration of mucosa.
2. Neoplasms.
3. Malformations.

4. Infection.
   (a) Granulomata; tuberculosis; syphilis, actinomycosis, etc.
   (b) Acute infections; danger; relation to deep cervical fascia, glottis, maxillary sinus, etc.
   Sub-periosteal abscess; necrosis, ankylosis, septicemia, etc.
   (c) Sub-acute or chronic.
   Patients "below par."
   Pyorrhea.
   Bone cavities; roughened apices, etc., illustrated by stereopticon.

The interpretation of X-ray plates and films; the question of resection of root-ends, curettage and extraction of teeth. When shall teeth be removed and when shall resection and curettage be resorted to? Infective cysts, joint lesions, rheumatism, endocarditis, neuritis, eye infection, ulcers of stomach and duodenum, appendicitis, etc., etc.

The relation of local foci of infection to general disease is doubtless the most acute and serious question in medicine to-day. The jaws and tonsils furnish the greatest number of these foci. The dentist has a very definite and vital relation to the question of infection and, therefore, a very serious responsibility to face.

This whole matter will be carefully discussed in detail and brought close to the general practitioner.

FREDERICK B. MOOREHEAD.

V. RELATION OF CERTAIN METABOLIC DISTURBANCES TO THE OSSEOUS SYTEM AND TO THE TEETH.

(a) A discussion of the function of the thyroid and thymus glands, the hypophysis and other glands furnishing internal secretions.

(b) The changes occurring in the bones and teeth in rachitic, scurvy, etc.

(c) Diet and the subject of "vitamines."

(d) Results of experimental studies with demonstrations.

D. J. DAVIS.

Alumni Association of the University of Buffalo, Dental Department.

The Fifteenth Annual Meeting of the Alumni Association Dental Department of the University of Buffalo will be held Friday and Saturday, February 5-6, 1915, at the Hotel Iroquois, Buffalo, N. Y.

Dr. C. N. Johnson, of Chicago, will read a paper entitled: "Certain Phases of Pulp Canal Treatment." Men of international reputation have been secured to talk and give practical demonstrations on the subjects requested by the members of the Alumni, namely: Pyorrhea, Anaesthesia,

Analgesia, Attachments for Removable Bridgework, Anatomical Occlusion, Porcelain and Gold Inlays and Radiography.

Friday evening an informal dinner will be given in honor of our guests, and the classes of 1895 and 1905 will hold their twentieth and tenth anniversaries.

The exhibitor's display will surpass that of any previous year. The room will be open during the entire meeting. All ethical dentists are cordially invited.

D. H. McCoy, President.

E. J. Farmer, Secretary.

The Oklahoma State Dental Society.

The next meeting of this society will be held in Oklahoma City, March 15, 16, 17, 18, 19, 1915.

The meeting will be conducted somewhat along the same lines (the post-graduate plan) that has proven so valuable in this State the past few years.

The principal lecturers will be Drs. J. H. Prothero and W. H. G. Logan, of Chicago. Dr. Prothero's lectures will be confined to important phases of Prosthetic Dentistry, while Dr. Logan will give lectures on modern methods of treating "Pyorrhea" and local anæsthesia.

Reputable dentists from out of the State are welcome to this meeting, but are required to pay a fee of five dollars for the lectures and clinics.

Enid, Okla. C. R. Laurence, Secretary

Southern Minnesota District Dental Society.

The Southern Minnesota District Dental Society will hold its annual meeting April 12th, 13th, and 14th, at Mankato, Minnesota.

A literary and clinical program will be carried out.

G. W. Norris, Secretary.

Tracy, Minn.

South Carolina State Board of Dental Examiners.

The next annual meeting of the South Carolina State Board of Dental Examiners will be held at Columbia, S. C., beginning at 9 A. M., Tuesday, June 15, 1915.

All applications must be in the hands of the Secretary not later than June 5, 1915.

Application blanks and instructions for applicants may be obtained by addressing,

R. L. Spencer, Secretary.

Bennettsville, S. C.